MASSACHUSETTS DIVISION OF FISHERIES & WILDLIFE

2023 ANNUAL REPORT

MASS**WILDLIFE**

Annual Report 2023

Massachusetts Division of Fisheries & Wildlife

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Director

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An agency of the Department of Fish & Game

MASSWILDLIFE

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Front Cover:

MassWildlife Moose and Deer Project Leader Martin Feehan delivers a box of venison to Daniel's Table in Framingham that was donated by hunters participating in MassWildlife's new Hunters Share the Harvest program. The program works with a network of processors, food pantries, and other partners and sponsors to distribute venison to Massachusetts families experiencing food insecurity. Photo by Troy Gipps/MassWildlife

Back Cover:

(Top) Volunteers and MassWildlife staff proudly pose with one of many truckloads of trash they removed from the Forest Lake Wildlife Management Area in Palmer. It was one of five WMA clean-ups conducted during the spring and summer to celebrate public lands. (Bottom) A wild brook trout caught by MassWildlife fisheries biologists using an electroshock boat during a sampling trip on the Swift River. Photos by Troy Gipps/MassWildlife

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1 The Board Report

Stephen A. Sears, Chair

Overview

The Massachusetts Fisheries and Wildlife Board consists of seven persons appointed by the Governor to 5-year terms. By law, the individuals appointed to the Board are volunteers, receiving no remuneration for their service to the Commonwealth. Five of the seven are selected on a regional basis, with one member, by statute, representing agricultural interests. The two remaining seats are held, also by statute, by a professional wildlife biologist or wildlife manager and one representative with a specific interest in the management and restoration of wildlife populations not classified as game species. The Board oversees the operations of MassWildlife; reviews the agency's programs; approves all personnel appointments; sets policy and regulations pertinent to wildlife in the Commonwealth; and votes to accept care, custody, and control of wildlife lands acquired through the Department of Fish and Game's Land Protection Program.

The COVID-19 pandemic that began in early 2020 and forced Governor Baker to execute various executive orders to protect staff and public health and safety continued to be of concern into FY 2023, until all mandated COVID restrictions were lifted, on May 12, 2023, under Governor Maura Healey's Administration. The modifications to portions of the state's Open Meeting laws that enabled municipal and state boards, including the Fisheries and Wildlife Board, to hold public meetings via open conference calls and virtual meeting video platforms (i.e., Zoom) were effective throughout the fiscal year, but all the Board's meetings were held in person during FY 2023. The Board held several public hearings on proposed regulatory changes during the year; details of those hearings are below. The Open Meeting law provisions originally enacted by Governor Baker were renewed before the end of the fiscal year by the legislature to continue through at least July 15, 2023.

While many different matters and issues are brought before the Board each year, most of its meeting time is spent in review and scrutiny of proposals for regulatory changes; of agency programs and policies; and of possible land and conservation-restriction acquisitions, usually, given the confidential nature of land-purchase negotiations, in executive session. Anyone interested in the details of the monthly meetings of the Fisheries and Wildlife Board is referred to the archive of approved Board meeting minutes the staff maintains on MassWildlife's website (Mass.Gov/Service-Details/Fisheries-and-Wildlife-Board-Meeting-Minutes).

This report is organized topically, then roughly chronologically within each topic. This predictable structure allows relatively easy searching and comparison of the Board's annual reports year over year.

Fiscal Year Highlights

In July 2022, Governor Baker appointed four new members to the Fisheries and Wildlife Board. Sasha Dyer of Barre, who is the Fish Health Manager at Great Falls Aquaculture, is from the Central District; John Organ of Buckland is the at-large member who is a Certified Wildlife Biologist; Emma Ellsworth of Orange, Executive Director Of the Mount Grace Land Conservation Trust, is from the Connecticut Valley District and also represents agricultural interests on the Board; and Matthew Sisk, Executive Director of Civil Process and Community Corrections with the Norfolk County Sheriff's Office, is the at-large member interested in species not hunted or fished.

The retiring members were Bonnie Booth of Spencer, the Board's Secretary for the previous 5 years and a member for 13 years; Dr. Joseph Larson of Pelham, who had served for 22 years, for the previous 5 as Chair; Michael Roche of Orange, who had served on the Board for 35 years, including as

Secretary and as Vice Chair; and Dr. Brandi Van Roo of Douglas, who served on the Board for 17 years. Director Mark Tisa put it very well when he said "the four outgoing Fisheries and Wildlife Board members have worked very hard over the years on a wide variety of issues, from numerous regulatory reviews and amendments to the agency's finances to MassWildlife's engagement with its longtime constituents and the citizens of Massachusetts at large. We are a stronger, more professional agency because of their tireless service, and we salute their individual and collective accomplishments on MassWildlife's behalf as we enter the next chapter."

Administrative Matters

Board Elections

The Board held its annual election of officers during the October business meeting, electing Mr. Sears to the Chair, Mr. Durand as the Vice Chair, and Mr. Foster as the Secretary of the Board.

Governance Meetings of the Board

The Chair of the Board announced at the December meeting that he wanted the Board members to have dedicated time for discussions among themselves outside the monthly business meetings, so that the Board members could get to know each other and compare their individual backgrounds, goals, and skills. Board members were asked to draft lists of their skills, etc., to share with the rest of the members and to be compared and collated later in the year. The first discussion, or governance, meeting was noticed and held in accordance with the Open Meeting Law on the same day as the January business meeting. Five governance meetings were held in the course of the fiscal year. Outlines of the discussions that were had can be found in the corresponding meeting minutes, available online at https://www.mass.gov/info-details/fisheries-and-wildlife-board-meeting-minutes.

Open Meeting Law Review

In March, DFW General Counsel Jennifer Sulla provided the Board with an examination and exposition of the Massachusetts Open Meeting Law and its implications for the Board's conduct and meetings. Ms. Sulla reviewed the purpose of the law, sited the governing statute and regulations, and defined the meetings that are covered by the law, as well as the concepts of 'deliberation,' 'quorum,' and 'jurisdiction' as they apply to the Board's meetings.

Ms. Sulla reviewed meeting in executive session, and detailed the ten purposes defined in the regulations for which an executive session can be held, noting that they are the only reasons acceptable under the law and that any other type of deliberation must be carried out in an open meeting. Ms. Sulla also reviewed the rules while in executive session and for remote participation by the public and by members, and the status of COVID emergency procedures.

Hunter Education Program Working Group

Chair Sears announced at the April meeting that he was establishing a Hunter Education Program working group of Board members and staff to review the program. The Board members named were Mr. Foster as Chair, Ms. Dyer, and Dr. Organ; the staff would include O&E Assistant Director McSweeney and Hunter Education Program Administrator Langlois, with other staff as the Director saw fit. Chair Sears reported that Mr. Foster would make monthly reports on the working group's progress until its work was completed and a report given to the Board.

Adopted Regulations and Other Votes of the Board

Proposed Regulatory Amendments to 321 CMR 3:00 Hunting; specifically, regulations relating to hunting of Pheasant, Quail, and Small Game

During the July meeting, Assistant Director for Wildlife Mike Huguenin reviewed the proposals that had gone to public hearing the previous month, which had originally been detailed during the January Board meeting. The proposals were to:

- Create a late pheasant/quail season to overlap with primitive deer season, closing at the end of the calendar year, so that interested hunters could pursue previously stocked, unharvested birds;
- Expand hunting hours on stocked WMAS and standardize hunting hours for pheasant/quail on all properties to between sunrise and sunset;

- Remove the WMA hunting implement restriction; standardize implements, i.e., shotgun and archery, for pheasant/quail;
- Simplify and expand hare/cottontail/gray squirrel season and remove the black-tailed jackrabbit season.

Assistant Director Huguenin reviewed the public comments received and reported that the vast majority of the comments were in support of the changes as proposed. Assistant Director Huguenin reported that staff recommended no changes to the original proposal. After a brief discussion, the Board voted to accept the changes as proposed.

Regulatory Amendments to 321 CMR 2.01 Retriever or Bird Dog Trials in Massachusetts

(A synopsis of the proposal to amend the regulations at 321 CMR 2.01 related to retriever or bird dog trials can be found in the Board's 2022 Annual Report under "Proposals for New, Updated, or Amended Regulations" on page 7.)

At the November meeting, Director Tisa reported that all the public comments received were in support of the regulations as proposed and that staff recommended no changes to the proposals. He asked the Chair for a vote to approve the draft regulations. The Board voted in favor of adopting the proposed regulations.

2023-2024 Migratory Game Bird Season Regulations: Public Hearing, Comment Review, and Vote

In February, the Board heard an outline of the staff's proposals for the 2023-2024 Migratory Game Bird hunting seasons, which as always were based on the expected federal frameworks for migratory bird hunting and the input and preferences of Massachusetts bird hunters.

In April, the staff held the public hearing and, at the close of the hearing, the Board voted to adopt the final regulation package as recommended. There was no written comment period after the hearing (which is normal for these regulations) because federal regulations require that states report their seasons by April 30, so that they can be recorded in the Federal Register by the end of May. For the final regulations, see MassWildlife's website at https://www.mass.gov/doc/2023-2024-migratory-game-bird-regulations/download

2022 Deer Review and 2023 Antlerless Deer Permit Allocations

Deer and Moose Project Leader Martin Feehan presented the annual Deer Review to the Board at its June meeting. He also presented the 2023 Antlerless Deer Permit (ADP) allocations, which were unchanged from the previous year and were endorsed by the Board. Please refer to pages 48-50 in the Wildlife Section of this Annual Report for the details of the 2022 deer hunting season and of the ADP allocations for 2023.

Proposals for New, Updated, or Amended Regulations

Archery Deer and Fall Turkey

During the November meeting, Assistant Director for Wildlife Mike Huguenin stated that Deer and Moose Project Leader Martin Feehan had proposed amendments to the Archery deer hunting regulations to the Board at its June meeting during the 2021 Deer Review. Particularly for the benefit of the new Board members, Mr. Huguenin explained that, based on deer harvest data, Mr. Feehan had asked the Board to direct staff to develop specific regulations that would extend the Archery deer hunting season statewide to match the current extended season in zones 10-14 and take those proposed regulations to a public hearing for public feedback and comments. The Board had complied and had voted unanimously in favor of sending draft regulations to a public hearing.

Mr. Huguenin then reported that DFG legal counsel had subsequently advised staff that the Board needed to be made specifically aware that modifications to the Archery deer season will result in automatic modifications to fall turkey season, specifically at 321 CMR 3.02(9). He stressed that no regulatory change is required in that regard. Mr. Huguenin reported that all the fall turkey regulations were intentionally framed to match the Archery deer regulations. An additional dedicated fall turkey tag was created in 2020 because it had been found through surveys that about half of fall turkey hunters do so while Archery deer hunting. He reported that

the Archery fall season represents more than 50% of the total turkey harvest since 2020. A modest harvest increase is expected across Zones 1-9, while only 15 turkeys were reported during the Archery-only season in the first 2 weeks in zones 10-13 in 2022, so the overall increase in harvest is expected to be both modest and sustainable.

After a brief discussion, the Board reaffirmed its approval to send the matter to a public hearing. That hearing had not been scheduled by the close of the fiscal year.

Agency Program Reviews

At the July meeting, Director Tisa reported that his senior staff would make a series of detailed presentations to the Board, to introduce the new members to the different programs of the agency and give all the members a complete review of MassWildlife's operations. Following are the presentations that were given, in chronological order, by month. Details of the presentations can be found in the corresponding meeting minutes, available online at mass.gov/info-details/fisheries-and-wildlife-board-meeting-minutes

August

Fisheries Program Overview by Todd Richards, Assistant Director of Fisheries

Connecticut Valley Wildlife District Overview by Joe Rogers, Connecticut Valley Wildlife District Manager

September

Central Wildlife District Overview by Todd Olanyk, Central Wildlife District Manager

October

MassWildlife Habitat Program Review by Brian Hawthorne, Habitat Program Manager

December

Natural Heritage and Endangered Species Program Overview by Eve Schlüter, Assistant Director for NHESP

Northeast Wildlife District Overview by Pat Huckery, Northeast Wildlife District Manager

January

Southeast Wildlife District Overview by Jason Zimmer, Southeast Wildlife District Manager

Wildlife Program Overview by Mike Huguenin, Assistant Director of Wildlife

February

Western Wildlife District Overview by Andrew Madden, Western Wildlife District Manager

March

Outreach and Education Program Overview by Nicole McSweeney, Assistant Director of Outreach and Education

April

R3 Review by Astrid Huseby, R3 Coordinator

Other Presentations on Topics of Interest to the Board

Southeast Pine Barrens

During the Board's September meeting, Deputy Director Jon Regosin reported that the agency had completed a review of two matters raised by a member of the public related to the Southeast Pine Barrens. Relative to AD Makepeace's Massachusetts Endangered Species Act (MESA) permitting, Dr. Regosin reported that the Board was provided with a memo prepared by Assistant Director for NHESP Eve Schlüter. In summary, he reported that the work being carried out by the company fully complies with the MESA permitting and mitigation requirements as specified in statute and regulation. For example, approximately 437 acres of high-quality pine barrens habitat supporting numerous state-listed species have been permanently protected by AD Makepeace pursuant to the MESA permit mitigation requirements. Relative to a Conservation Restriction (CR) held by MassWildlife over Plymouth Town Forest, the Deputy Director reported that MassWildlife is supportive, in principle, of a request from the Town of Plymouth to amend the CR to allow limited additional parking. The amendment will facilitate limited additional recreational access,

consistent with the purposes of the CR, and without negatively impacting rare plants or habitats.

The Fisheries and Wildlife Board's Wildlife Trust Responsibilities

At the October business meeting, Board member John Organ provided the Board with a presentation that outlined its public trust responsibilities, the doctrines and principles behind them, the implications of its public trust responsibilities for board governance and action, the barriers to meeting them, and the extreme importance of the Board's actions in that context.

Dr. Organ explained that the Public Trust Doctrine is based on common law, defining ownership of wildlife resources in the U.S. The principles that underlie the Public Trust Doctrine include the idea that ownership is assigned to the states, except for rights reserved for the federal government, and that wildlife is property to be held in trust for the benefit of current and future generations. He also pointed out that there are other statutory state and federal laws derived from this common law base. In Massachusetts, the wildlife trust is to protect and manage the wildlife of the Commonwealth as an essential public natural resource for the use and enjoyment of all citizens who hunt, fish, trap, and enjoy nature study and observation. This includes all mammals, birds, and freshwater fish, plus insects, invertebrates and plants that are listed under state and federal regulations as rare, endangered, threatened, or of special concern, over 400 species in total.

Dr. Organ then outlined the principles of trusteeship as applied to wildlife resources, with the government as the trustee, and the implications of the Public Trust Doctrine for governmental responsibility, including that all citizens are the beneficiaries and that there needs to be an equitable allocation of benefits. He pointed out that this in turn requires balanced, science-based information on the needs and interests of all beneficiaries; a governance model that facilitates inclusiveness and avoids bias; and the responsibility to provide resources for the management of the trust. Dr. Organ then provided a detailed discussion of the principles of governance in the context of wildlife resources and stressed that the real work of the Fisheries and Wildlife Board is its decision-making function, which must abide by all those principles, including adaptability, inclusivity, responsiveness, and public accountability. Dr. Organ also talked about the barriers to fulfilling public trust responsibilities that the Board faces, including the limited ability to affect land-use decisions and its dependency on a narrow base of funding.

Dr. Organ argued that the Board's public trust responsibilities are best met by adopting the principles of wildlife governance, which provide a framework for the execution of its trust responsibilities, put the focus on the barriers to success, and aid in more broad-based funding initiatives. An engaged public is more likely to understand the need for wildlife conservation, and a broader base of people who understand and appreciate the benefits of the trust reduces the influence of special interests, ensuring that the trustee-beneficiary relationship will endure. The Fisheries and Wildlife Board must demonstrate its relevance to the public by meeting the challenge of combining scientific integrity, social responsibility, and sound public policy in MassWildlife's wildlife-conservation actions.

Depredation Working Group Final Report and Recommendations for a Vote of the Board

Vice Chair Bob Durand reported that the Board had received comments from the bear and deer damage committee of the Massachusetts Sportsmen's Council (MSC) earlier in the year. The Chair at the time had formed a working group of Board members and staff to examine the issues and possible remedies. Mr. Durand reported that the working group had consisted of Ms. Booth, Mr. Sears, and himself as Board members; Assistant Director Huguenin; Black Bear Project Leader Dave Wattles; and Deer and Moose Project Leader Martin Feehan, and that the Director and Commissioner had also participated. With the reconstitution of the Board, Ms. Ellsworth had joined.

Mr. Durand stated that the working group did not want to overemphasize the problem beyond the reality, so staff did an analysis of the data provided. The report from the MSC had listed 200 incidents, of which 20 were farm related. The working group found that most of the incidents reported can be taken care of with existing permits and other remedies and that it came down to 5-6 farms in the Commonwealth that have an ongoing issue.

Mr. Durand reported that the working group identified three options: increased farm-community outreach, by both consulting and coordinating with agriculture agencies like the Mass. Department of Agriculture Resources (MDAR) and communicating directly with the farming community via email and in the MassWildlife newsletter, and by using SEO [search engine optimization] to get better exposure for the relevant web pages. The working group also recommends providing links between the MassWildlife website and the MDAR website; connecting the county leagues, the MSC, and the MCA to the MassWildlife website, for better synergy; and connecting to the farm bureau, blueberry farms, etc. Mr. Durand explained that the land must be open to hunting for the owner to secure a depredation permit. The working group also stressed optimizing the number of hunters that would know about and have access to the problem areas by informally connecting hunters to farmers. He reported that staff has found that farms with consistent hunting pressure can minimize damage significantly in the long term.

In conclusion, Mr. Durand stated that unfortunately depredation has and will always continue to happen; that research and experience show that fences and other deterrents are sometimes the best options; that lethal removal through hunting can also be helpful; that Chapter 131, Section 37, allows landowners to protect property and safety; that depredation permits are issued in rare circumstances to allow them to reduce damage on their own land in extreme cases. For cases where the problem is not so severe, the working group recommended using the various tools and online and social avenues available to get the word out better about areas that need additional hunting pressure. He noted that the Board's vote will grant the District Managers more leeway to lower acreage minimums where necessary, especially given that deer density has tripled since regulation and permit were created. The District Managers may also add other species besides deer. Finally, he reported that the vote will allow the staff to make necessary changes to existing policy, and that no statutory or regulatory changes are recommended.

After a brief discussion the Board members voted to affirm their support for the proposals.

Massachusetts Fisheries and Wildlife Board

Stephen A. Sears, Dalton (Chair)
Bob Durand, Marlborough (Vice Chair)
Ernest W. Foster IV, Scituate (Secretary)
Sasha Dyer, Barre
Emma Ellsworth, Orange
Dr. John Organ, CWB®; Buckland
Matthew Sisk, Braintree

2 The Fisheries Program

Todd Richards, Assistant Director of Fisheries

Overview

Fisheries Program goals focus on three major categories: providing excellent recreational angling; restoring waterbodies for the benefit of all fish and wildlife resources; and monitoring fish communities for research, prioritization for restoration actions, and technical assistance.

Recreational angling in Massachusetts is promoted and supported through many fisheries program activities, including hatchery operations, regulation and management revisions, and improvements in our ability to provide our information to the angling public. Trout fishing, especially in our lakes and ponds, would simply not exist without this program. The fish we grow provide not only recreation but are also a critical economic factor, with every dollar spent on trout leading to $22 back to the Massachusetts economy. These fish are an excellent source of protein, providing hundreds of thousands of pounds of healthy food for Massachusetts anglers.

High-quality recreation is not just a construct of the hatcheries, however. Our waters continue to provide excellent fishing for more than 20 self-sustaining (not stocked) game species in addition to stocked trout and salmon. This year saw 8 new state records through the Sportfish Awards Program, which included 1875 trophy fish caught and submitted to the Program. Over the past several years, the popularity of the catch and release category has increased dramatically, accounting for nearly 90% of the awards. This year also saw the addition of the Youth Catch and Release category and the addition of two unique species to the list of fish eligible for the Sportfish Award Program.

Our research this year, in collaboration with many partners, included the development of regional fish and mussel biodiversity metrics, stream flow studies to better understand the relationship between stream flow and municipal groundwater withdrawal, the conclusion of brown trout population parameters and movement, and the development of an air and water temperature model. The results of this work were used to alter trout stocking practices, helped sister agencies issue water withdrawal permits and increase our relevance in the climate change realm.

Considerable effort from the program was also invested in fish community monitoring, land acquisition, updating our public facing recreational products like GoFishMA! and mass.gov/trout, and maintaining or removing MassWildlife-owned dams.

Finally, considerable time was spent gaining a better understanding of the potential transformational federal funding that is and will be available for restoration like aquatic organism passage and habitat restoration. This information and a focus on landscape scale conservation were instrumental in allowing MassWildlife to apply for an additional America the beautiful challenge grant opportunity, with decisions on final funding coming in FY 2024.

Aquatic Habitat Conservation

In collaboration with Jennifer Rogers, Graziella DiRenzo, and Allison Roy of the Fish and Wildlife Cooperative Research Unit, UMass Amherst

Conservation of Regional Aquatic Biodiversity

While updating BioMap in 2022, staff identified additional analyses that would advance conservation of aquatic biodiversity. Two critical components that would enhance BioMap (2023) include an in-depth evaluation of downscaled climate change projections on habitats and biota and consideration of habitat connectivity and species status beyond state lines. Consequently, we developed a two-year project with the Massachusetts Cooperative Fish and Wildlife Research Unit to address this need, with postdoctoral researcher Jennifer Rogers as the

project lead. The aim of this project was to incorporate existing climate change research into a framework that evaluates the conservation of aquatic biodiversity under a suite of land protection and restoration scenarios with the ultimate goal of identifying management actions (e.g., revegetation of riparian forests, dam removal) that optimize conservation. Components of biodiversity evaluated were fish and freshwater mussel assemblages across New England. Increasing the geographic scope of existing statewide evaluations will be particularly useful for understanding ecosystem responses across a range of conditions. For instance, conditions in southernly states (Massachusetts, Connecticut) could act as analogs for warmer, future conditions in more northernly states (New Hampshire, Vermont). In order to collaborate with other agencies, biologists from all six New England states met twice in FY 2023. These meetings were used to evaluate state data, develop standardized biodiversity metrics, and review preliminary results.

Methods

Fish survey data were received from 8 state agencies. Of these, only surveys (n ~26,000) conducted with electrofishing backpacks in rivers and streams were used in analyses. Data were further edited to exclude marine, estuarine, diadromous, and stocked fishes. Abundance data were used to determine presence/absence and relative abundance of individual species by watershed. Cluster analysis was used to parse species into defined habitat and temperature assemblages. Zero-inflated beta models were subsequently built to predict the probability of individual species' and habitat/temperature (cold-, cool-, warmwater) guilds' presence given environmental variables and watershed characteristics ().

Preliminary Results

Evaluation of results continues but preliminary review of fish biodiversity models provides some interesting insights. Although most conservation frameworks use three temperature guilds (cold-, cool-, warmwater), results suggest that as many as six additional guilds should be considered in order to adequately protect all fish species. Furthermore, each guild likely responds to different variables in different ways. For example, coldwater fishes were significantly impacted by summer flow and winter floods but the direction (positive vs. negative) of effects were associated with elevation. Coolwater fishes were also impacted by winter floods (negative) but may be more influenced by summer flow than coldwater fishes. Warmwater fishes are likely positively impacted by winter floods, dam density, percent wetland, and summer temperatures but negatively impacted by percent agriculture and water table depth.

Results from the fish species analyses will be used in a second modeling effort in FY 2024 that evaluates the probability of freshwater mussel presence/absence based on host fish distributions.

Hamant Brook Study

In FY 2022, MassWildlife entered its third year of monitoring potential impacts of water withdrawal from Town Well #4 on conditions in Hamant Brook, Sturbridge. The town hired a consultant to monitor water level and temperature at four sites; the Town Dept. of Public Works (contact Shane Moody) also monitored staff gage levels at three sites near the well. This monitoring was required in Sturbridge's Water Management Act permit to evaluate the potential adverse impacts of pumping on the brook. To further evaluate these impacts, the Town, after consultation with staff from MA Department of Environmental Protection (MA DEP) and MassWildlife, was granted a temporary waiver on the operational limitations on the use of Well #4. The waiver allowed Sturbridge to use Well #4 during stream monitoring conducted June 1, 2022–October 1, 2022, under specific conditions.

In summer 2022, MassWildlife, the Town of Sturbridge Department of Public Works, and McClure, Inc., conducted a study to evaluate the potential impact of town's Well #4 operations on Hamant Brook water levels and temperature. Data were collected from June 1 thru September 30 at 4 stations along the brook. Station 1 was located upstream of the well. Station 2 was about perpendicular to the well. Station 3 was downstream of the well and just downstream of an unnamed tributary flowing into Hamant Brook at river left. Station 4 was located within the site of dam removals and associated restoration completed by MassWildlife in 2017. Cross correlation, partial correlation, and biserial correlations were used to evaluate significant effects ($\alpha = 0.05$) between pumping rate, water level and temperature separately at each station. Precipitation was found to have a positive effect at all stations and was

included as a random variable to account for its influence in subsequent analyses. While pump operations were found to decrease water levels at all stations within hours of being turned on, water levels appeared to stabilize within 24 hours. Therefore, we concluded that well operations were not significantly affecting water levels in Hamant Brook under the parameters evaluated in the study. Short-term (<24 hours) decreases in water levels are likely being replenished by an influx of groundwater which results in decreasing water temperatures. The significant negative results between pump operations and water temperatures support this finding. However, well operations are most likely depleting cold groundwater inputs to the Quinebaug River.

We presented the following recommendations to prevent potential adverse impacts to Hamant Brook during summer months and allow for more flexibility of pumping operations. The recommendations are intended to allow the operation of the well under conditions used in the study. In summer 2022, the highest drought status level in the Central Region was a level 3 during the months of July and August (https://www.mass.gov/info-details/drought-status). Conditions of more severe drought or more extensive pumping would be considered outside the scope of this work. We initially recommend that conditions are monitored in Hamant Brook throughout the summer seasons with a transponder monitoring water levels at station 2 from June 1-September 30. That would require a transponder be put in place with an established elevation by May 20 for readings to stabilize. Furthermore, from June 1—September 30, during regional drought status level 3 or below, the pump may be operated in 5-days-on/5-days-off cycles at a maximum rate of 0.45 MGD. In summer months with regional drought status level 4, or if station 2 water levels fall below 0.4 feet of first reading, the Town will stop pumping at Well #4 and use other sources of water. Upon further discussion with DEP (September 2023), recommendations were amended as pumping operations can go unlimited when streamflow in the Sevenmile River stays above 1.64 cfs and if the regional drought status is at a level <3. If the Sevenmile River flow drops below 1.64 cfs but the regional drought status is a 3 or lower, pump operations can go to a 5-day-maximum-on/5-day-minimum-off schedule. Pump operations would cease while the regional drought status level is at 4.

Federal Energy Regulatory Commission (FERC) Licensed Projects

In FY 2023, MassWildlife continued consultation and environmental review of several FERC-licensed projects including:

- Blackstone and Methuen Falls Projects, where American Eel ramp siting studies were proposed,
- Chicopee River Projects, where Project operations were reviewed and water quality monitored,
- Centennial Project, where new ¾-inch trash racks were proposed,
- Talbot Mills, where dam removal was evaluated,
- Lowell Project, where fish passage was designed, and
- Lawrence Project, where river herring monitoring and stocking methods were reviewed.

Climate Adaptation

Resilient Massachusetts

MassWildlife is one of the many state agencies that meet quarterly with the Resilient Massachusetts Action Team, the group tasked with updating and implementing the State Hazard Mitigation and Climate Adaptation Plan (aka ResilientMass Plan). This fiscal year, MassWildlife has given extensive feedback to consultants developing and writing the state's ResilientMass Plan (2023). The assessment evaluates the impact of climate change on different state sectors (e.g., economy, built environment, natural environment) and reports the state's biggest vulnerabilities. The agency's primary recommendation was for consideration of natural resource components (e.g., forests, waterbodies, imperiled species) on equal footing as infrastructure and public health. State documents have traditionally deemphasized potential impacts to, and investments needed for, the conservation of the state's natural resources. Additional staff were included in the Plan's review as subject matter experts on coastal habitats, forest ecology, and invasive species management.

In FY 2023, MassWildlife was awarded capital funding, associated with ResilientMass Plan implementation, to combine streamflow and water temperature models in order to assess how concurrent climate change impacts are likely to change streams.

Streamflow and Water Temperature Modeling in collaboration with Walker Environmental Research LLC

MassWildlife has worked with partners to identify coldwater climate change refugia across the state, largely as a GIS exercise. To date, we have used models to determine point locations most likely to remain cold under warming scenarios of 2, 4, and 6 degrees Celsius. However, climate change is also altering habitat suitability through changing precipitation patterns that govern streamflow. Walker Environmental Research LLC) was hired to explore how existing water temperature and streamflow models could be linked to identify climate change refugia from both warming temperatures and changing hydrologic conditions. He was tasked with comparing modeling frameworks that considered both streamflow and water temperature data, identifying water temperature and streamflow data sources in Massachusetts, updating existing temperature models with the most recent climate change projections (from resilientma.org), expanding models to also evaluate cool- and warmwater habitats, and creating a publicly available webpage to display results.

Data from ~1,400 stations collected by 20 organizations were gathered from state and Federal agencies, watershed groups and NGOs then edited and standardized. Water temperature data were used to expand modeling of probable future stream temperatures across the state. Streamflow data will be used to run models that evaluate both temperature and streamflow once additional streamflow data are gathered. Additionally, climate change projections in Massachusetts have been updated since water temperature models were first developed so this project provided the opportunity to integrate the latest projections. This project advances the agency's 2018 Priority Action "Identification of coldwater climate refugia and transitional waters for protections of CFRs" and addresses the 2022 State Climate Assessment's vulnerability of Freshwater Ecosystem Degradation. For the first time, the temperature regime of entire river systems in the state have been modeled and mapped to understand the relative warming probability of habitats from headwater streams to large mainstem rivers (Figure F 1). Results can be viewed at: https://walkerenvres.com/dev/masswildlife/.

Of the ~1,400 stations from which data were collected, only 30 collected both streamflow and temperature for more than one year. Consequently, more stations are needed to ground streamflow models with data captured across a variety of sites. We are currently working with partners at US Geological Survey (USGS) to expand data collection to another ~100 stations. This project provides the basis for a regional flow and temperature modeling effort led by Dr. Jennifer Fair of the USGS. With funding from the Northeast Climate Adaptation Science Center, the upcoming USGS project will build on the datasets, methods, models, and knowledge gained through this project to develop a new regional joint stream temperature and flow model that evaluates climate change impacts on stream habitats across the northeast US. The transfer of data, models, and knowledge created by this project will be facilitated by MassWildlife and Jeff Walker as collaborators on that effort.

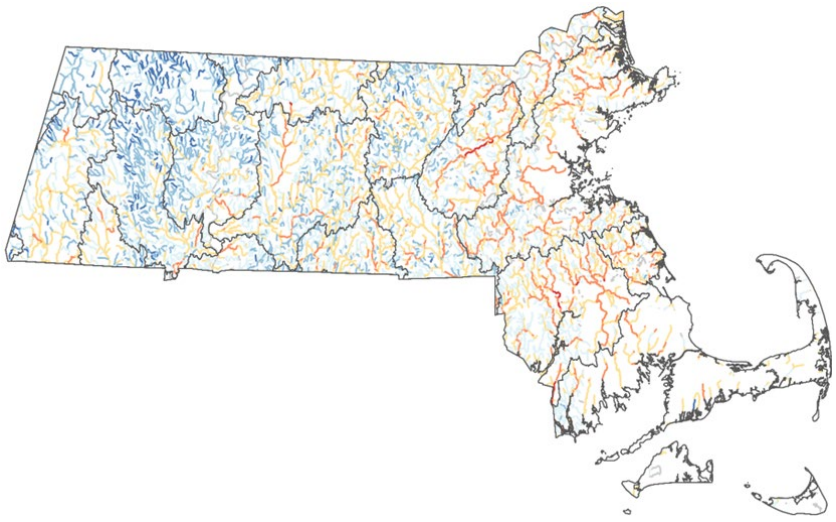


Figure F 1. Probable summer locations of cold (blue), cool (orange) and warm (red) habitats in rivers and streams by 2100.

Other Climate Projects

Climate Adaptation Projects

Staff developed and submitted five proposals for climate-adaptive projects to be implemented in FY 2024. Four of the five projects were awarded funding by the Executive Office of Energy and Environmental Affairs from funds associated with the ResilientMass Plan. The four projects (and their agency leads) are:

- Identifying the environmental drivers and projected impacts of climate change on Massachusetts freshwater mussel biodiversity for successful conservation and protection of water quality (Rebecca Quiñones, Jason Carmignani).
- Statewide evaluation of Atlantic White Cedar Wetlands to climate-change facilitated stresses and prioritization of actions to restore resilient ecosystems and build partnerships for long-term stewardship (Caren Caljouw).
- Conversion of non-native cool-season grasslands in the Quaboag River Valley to native warm-season grasslands (Alex Entrup).
- Statewide assessment of Pitch Pine (*Pinus rigida*) Ecosystem vulnerability to climate-change facilitated expansion of Southern Pine Beetle (*Dendroctonus frontalis*; Alex Entrup).

All projects address extreme climate change vulnerabilities of the state's natural environment as defined in the State Climate Assessment (2022). Specifically, projects address degradation of freshwater ecosystems, loss of biodiversity, degradation of forest health, and climate mitigation (i.e. carbon sequestration).

Agency Vulnerability Assessment

In FY 2023, staff representing several sections of the agency came together to rank MassWildlife's assets and services most vulnerable to climate change. The team was comprised of Rebecca Quiñones, Nicole McSweeney, Eve Schluter, Andrew Madden, Jody Simoes, Caleb Slater and Steven Mattocks. The group first created a list of all assets (e.g., Hatcheries, habitats, species) and services (e.g., hunter and angler education, wildfire response) and then ranked each as to how vulnerable they are to rising temperatures, extreme weather, sea level rise, more frequent wildfire, etc. The group then identified resources that would be valuable to have in order to adequately address future hazards. These included funding for habitat management, staff positions to address emergency response and climate communications, authority to propel restoration projects forward (especially dealing with permitting constraints), and funding to retrofit hatchery infrastructure. Assets and services defined as most vulnerable included state-owned roads and dams, sensitive habitats (e.g., bogs, salt marshes, cold- and cool water streams), prescribed burning, ice fishing angler education, and Sandwich Hatchery.

Working Groups

MassWildlife continues to participate in several climate adaption working groups. At the national level, the National Fish, Wildlife, and Plants Climate Adaptation Network is continuing progress to update the 2015 [National] Climate Adaptation Strategy. MassWildlife also participates in meetings of AFWA's Climate Adaption Committee. At the regional level, the Northeast Climate Change Working Group brings together practitioners to share climate-smart projects and discuss challenges and Dr. Quiñones continues to sit on the Northeast Climate Adaptation Science Center's Advisory Committee.

Instream Flow Council (IFC)

Dr. Rebecca Quiñones transitioned into the role of Regional Director-elect for the northeast region and continued acting as IFC Secretary. Her duties include taking and distributing meeting notes, updating member lists, sending members yearly dues packets, developing focus topics for the Instream Flow and Water Level Training Center, and participating as a voting member in the Governing Council and Executive Committee meetings.

Dam removal (led by Katherine Abbott)

MassWildlife continues to collaborate on dam removal research in Massachusetts. In FY 2023, Dr. Quiñones continued participating as a member of Katherine Abbott's dissertation and defense committee (Ecology Program, UMass-Amherst). Over the last five years, Ms. Abbott has been evaluating pre- and post-dam removal impacts on abiotic conditions, macroinvertebrates, and fishes at 16 sites. She graduated in June 2023.

Fisheries Sampling

Biological Data

Each year, MassWildlife fisheries biologists and District staff collect fish community data from lakes, ponds, streams, and rivers throughout the commonwealth. These data serve to keep biologists abreast of current conditions, address project-specific needs, and facilitate statewide statistical analyses examining factors affecting fish populations. Since 1996 when sampling methodologies were largely standardized, fisheries staff have conducted approximately 8,642 fisheries samples in 3,036 unique waterbodies including 940,628 individual fish records.

With over 2,700 named streams and rivers encompassing over 48,000 miles and 3,158 lakes and ponds in Massachusetts, maintaining current records with limited time and resources is difficult. Each year priority sampling sites are distributed to District personnel for visitation and data collection. Sampling sites are selected based upon revisit intervals calculated from past efforts, discovery of previously unsampled streams, project-specific needs, and public and partner requests. Sites are assembled, coordinates and access double checked, separated by District, and released to regional fish biologists. In FY 2023, 224 unique sampling sites were prioritized across the five MassWildlife Districts. Sites included streams with active and planned dam removals, unsampled waters, coldwater fisheries and suspected coldwater fisheries, and sites that had not been visited recently.

Fisheries samples in streams and medium sized rivers are typically executed between June 1st and August 31st and conducted primarily using backpack electrofishing. Electrofishing is a standard technique whereby an electric current is applied to the water creating a small field. The field is moved through the water as the biologist walks upstream and any fish that is encountered is temporarily immobilized and netted. Biologists typically traverse 100 meters of stream, collecting immobilized fish using 1-4 backpack electrofishing units (depending on stream width) and placing them into buckets. Once the entire reach has been passed through once, fish are identified to species, measured for length or otherwise enumerated, then released back close to the point of capture. Accessory data including GPS coordinates, effort, efficiency and habitat comments, average stream width, water temperature, conductivity, and pH are also recorded onto paper data sheets.

Lake, pond, and larger river samples are primarily conducted using boat electrofishing. This technique is similar to backpack electrofishing except the field is much larger and centered around and moved by a boat. Stunned fish are collected over 15-minute timed runs as the boat moves through littoral areas of a waterbody. Additional passive and active fish capture gears such as gill nets and seines may also be employed depending on the habitat available in the lake or pond. Fish are measured and enumerated as in other waterbodies and weights are collected on selected game and forage fish.

Results of this year's fish community sampling efforts are further discussed in the Data Management section of this report.

Fishing Access Data

GoFishMA! is an online map application that provides the public with information on locations to fish throughout the commonwealth. The initial data included in the application were driven by 273 Office of Fishing and Boating Access sites, limited to developed or otherwise improved boat ramps. While expansive, these data lacked specific information such as any special regulations pertaining to the waterbody, information on shore access, and pictures. Furthermore, smaller shore and kayak access sites on public land and less-frequented or less-well-known boat ramps were not included. Each year, additional fishing access sites are visited and documented for ultimate inclusion in the online application. In FY 2023, an additional 151 public access sites from 123 unique waterbodies were located and added to the GoFishMA! database. As a result, GoFishMA! data include a total of 574 unique fishing and boating access points. These new points are prioritized for the collection of more detailed access information including narratives of access, pictures, shore fishing, and documentation of special regulations. This more detailed documenting process was completed on 22 waterbodies in FY 2023 (Table F 1).

Table F 1. Waterbodies where fishing access was documented and visited in FY 2023 for inclusion in the GoFishMA! web application.

Waterbody	Town	District	Watershed
Buffamville Lake	Charlton	Central	French
Cheshire Reservoir (Mid. Basin)	Cheshire, Lanesborough	Western	Hoosic
Cheshire Reservoir (N Basin)	Cheshire, Lanesborough	Western	Hoosic
Dark Brook Reservoir	Auburn	Central	Blackstone
Delaney Flood Control	Stow, Harvard	Central	Concord
East Brimfield Reservoir	Brimfield, Sturbridge	Conn. Valley	Quinebaug
East Waushacum Pond	Sterling	Central	Nashua
Flint Pond	Worcester, Shrewsbury	Central	Blackstone
Jacobs Pond	Norwell	Northeast	South Coastal
Lake Quinsigamond	Worcester, Shrewsbury	Central	Blackstone
Lake Ripple	Grafton	Central	Blackstone
Lake Singletary	Sutton	Central	Blackstone
Lake Wallum	Douglas	Central	Blackstone
Lake Webster	Webster	Central	French
Long Pond	Sturbridge	Conn. Valley	Quinebaug
South Meadow Pond	Clinton	Central	Nashua
Coachlace Pond	Clinton	Central	Nashua
Lovells Pond	Barnstable	Southeast	Cape Cod
Manchaug Lake	Sutton, Douglas	Central	Blackstone
Mirror Lake	Harvard	Central	Nashua
Newton Pond	Shrewsbury, Boylston	Central	Blackstone
Rocky Pond	Boylston	Central	Concord

Beginning in 2015, MassWildlife began to update its pond maps with new bathymetry. Bathymetry data are collected using a combined GPS depth sounder that collects paired depth and GPS locations at predetermined intervals as an operator navigates a grid pattern on a waterbody using a small boat.

Typically, between 5,000 and upwards of 40,000 datapoints (depending on the size of the waterbody) will be collected during the course of a bathymetry survey. In FY 2023, bathymetry data were collected on seven new waterbodies (Table F 2).

Table F 2. Lakes and ponds surveyed for bathymetry in FY 2023.

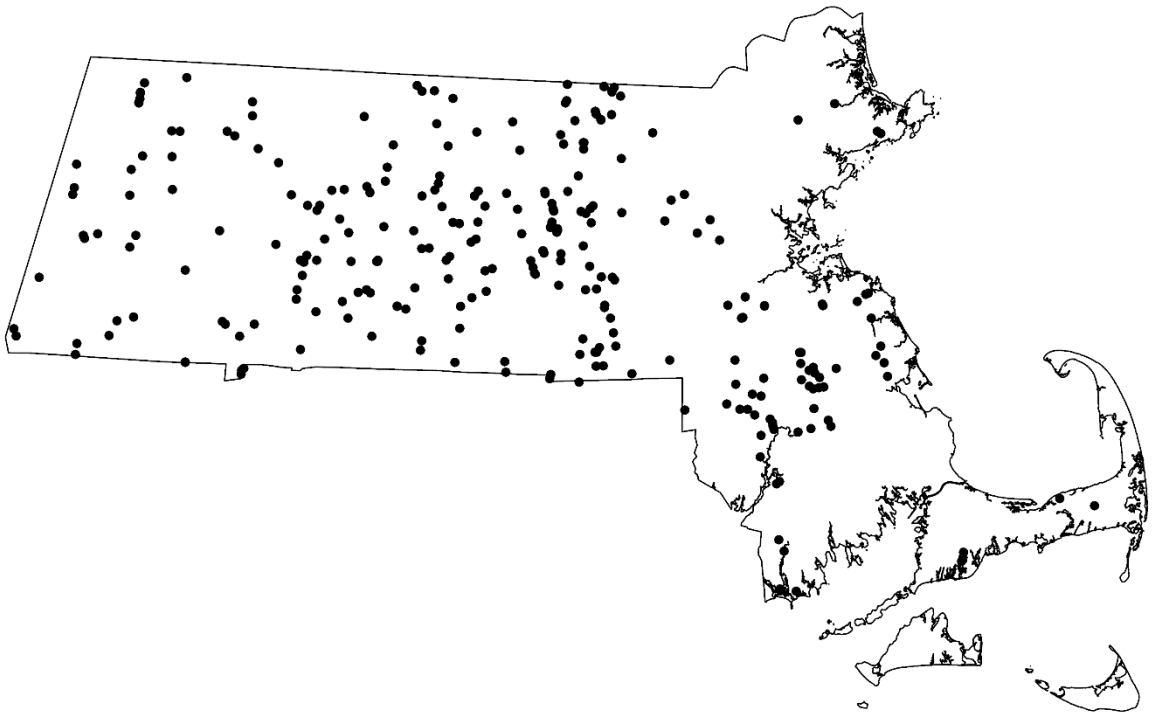
Waterbody	Town	District	Watershed
Cheshire Reservoir (Mid. basin)	Cheshire, Lanesborough	Western	Hoosic
Cheshire Reservoir (N. basin)	Cheshire, Lanesborough	Western	Hoosic
Delaney flood control	Stow, Harvard	Central	Concord
Jacobs Pond	Norwell	Northeast	South Coastal
Little Mirror Lake	Harvard	Central	Nashua
Lovells Pond	Barnstable	Southeast	Cape Cod
Newton Pond	Shrewsbury, Boylston	Central	Blackstone

Data And Database Management and GIS Extension of Fisheries Data

Biological and water quality data

Following the cessation of field activities for the season, biological and water quality field data are entered into custom excel spreadsheets by District staff. The spreadsheets have built-in validation and are structured to automate quality control and compilation into the fisheries database. Data are prescreened for incorrect species information, inaccurate GPS coordinates, lengths and weights in exceedance of three times the interquartile range of statewide averages, water quality outliers and general completeness. Raw datasheets are electronically scanned, and paper copies filed at the Field Headquarters and electronically on the MassWildlife network. In FY 2023, a total of 344 new fisheries samples were added to the fisheries database (Figure F 2). Of these, 134 were collected by the Massachusetts Department of Environmental Protection between 2019 and 2022 as part of their stream monitoring activities.

Figure F 2. Locations where MassWildlife fisheries sampling was conducted in FY 2023.



Weight and length data are post-processed using linear modeling to estimate the relationship between log-transformed weight and length for each species within and among (statewide) waterbodies. Residuals from statewide regressions for each species are used to eliminate outliers using quartile ranges. Relative weight is calculated from statewide quadratic weight-length regressions for each species and waterbody and exported as a separate table within the fisheries database.

Bathymetry Data

Bathymetry data are prescreened using custom R scripts that delete erroneous depth points and identify and remove duplicate data. GPS and depth data are exported as .csv files for entry in the ArcGIS Pro, where they are projected and examined for errors manually. Fast turns, dense weed beds, and otherwise rough conditions can cause the GPS depth sounder to lose the bottom, which can result in erroneous depths. Visual examination is the best way to locate and exclude these points.

Depth data are interpolated to a continuous depth surface using two methods: inverse distance weighting (IDW) and triangular irregular networks (TIN). The former method combined with a smoothing kernel creates flowing depth contours that are visually pleasing but generalized relative to the more chaotic but accurate TIN surfaces. As such, IDW bathymetry surfaces are used primarily for mapping applications such as MassWildlife pond maps and online mapping applications, while TIN surfaces are used for the estimation of lake statistics such as lake volume and littoral habitat area that complement internal statistical analyses.

Spatial Extension of Fisheries Data

Once tabular data are entered into access databases, information is tied to spatial attributes such as sampling locations, stream centerlines, and watersheds using ArcGIS Pro. Custom R scripts are used to create a table of summary data for each sampling point (MassWildlife Annual Report 2018; Appendix B), including species, abundances, sample type, date, presence of coldwater fish, hyperlinks to scanned raw datasheets and scanned historical documents and other information that biologists can use to rapidly access the character of a stream or waterbody. These data are exported from the database and imported as points into ArcGIS where they are cross-referenced with the National Hydrography Dataset (NHD) stream linework and waterbody polygons that have been sampled by MassWildlife in the past. Using the unique identifier of each stream and waterbody, the sampling point data and stream and waterbody line and polygon data are rectified. Errors are identified as instances where the unique identifier of a point is not in agreement with the unique identifier of the closest line or polygon to that point. Via this process, errors in coordinates or identifiers are found and resolved, and streams and waterbodies that have not been previously sampled are added to the hydrography dataset and assigned a unique identifier. Finally, sampling points are snapped to stream center lines and polygons, and snapped coordinates are exported from ArcGIS and imported back to the fisheries database via R scripts. Once the fisheries data are plotted and errors are fixed, value-added spatial data layers and products such as the coldwater fisheries resource layer may be easily generated by sub-setting these master layers using simple queries in ArcGIS.

Robust GIS analyses require accurate boundaries from which to calculate physical habitat metrics. Watershed boundaries of lotic systems are typically delineated using digital elevation models. While this approach can be used for lentic systems as well, anthropogenic effects proximal to the shorelines may also be important in structuring fish communities in these systems. To capture shoreline habitat data effectively, accurate shorelines are paramount. Current shorelines contained within the national hydrography dataset were delineated from topographic maps and are not precise. Following the initial efforts to redelineate all the lake and pond shorelines in 2017, efforts are ongoing to continue to update shorelines where appropriate. Furthermore, watershed boundaries continue to be delineated for all sampling points as needed and land use characteristics and impervious cover summarized. To date, sub-watersheds have been delineated for all samples conducted between 2000 and 2021, which equates to more than 7,000 unique polygons. Subwatershed boundaries are used to extract land use characteristics upstream of each fish sampling point. National land cover data (2001, 2006, 2011, 2016) are clipped for each subwatershed and expressed as percentages of watershed area. Finally, estimates of percentage change of each land cover class are computed between years.

In addition to land use statistics reported above, finer scale metrics such as structure and parcel density, and shoreline sinuosity are calculated for lakes in ponds. Furthermore, lakes and ponds with bathymetry and water quality data permit the calculation of lake volume, coldwater and anoxic volume, littoral habitat area, and numerous drawdown exposure statistics.

Following the compilation of these updates, spatial summary layers, tables, and the fisheries Microsoft Access database are distributed to partners at USGS, DEP, DER, and the Massachusetts Cooperative Fish and Wildlife Research Unit at UMass as needed.

Lake Trout Sampling

Lake trout were initially stocked in Quabbin Reservoir in 1952 and began to enter the creel in 1956. Since then, populations have expanded into Wachusett Reservoir, and comprise arguably one of the most popular sport fisheries in the Commonwealth. Since the initial stocking, lake trout in Quabbin Reservoir have been monitored almost continually using various mark recapture methods most recently employing passive integrated transponder (PIT) tags beginning in 2006. Similar efforts commenced in Wachusett Reservoir in 2014. Each fall, spawning lake trout are sampled using 100 ft experimental gillnets set at night over known spawning locations. Nets fish for approximately 30 minutes and captured lake trout are gently removed from the net and scanned for the presence of a PIT tag using a PIT tag reader. If no tag is present, a 10mm PIT tag is implanted within the pelvic girdle of the fish. The unique tag number is recorded along with the length, and weight of the fish. Prior to release, the adipose fin is clipped to serve as a visual secondary mark.

Data are entered into a database, checked for consistency and general linear modeling is used to determine the relationship between log transformed weight and length within waterbodies and sexes. Relative weight is then calculated among waterbodies and sexes and used to evaluate and track changes in condition over time in both waterbodies. Growth rates are calculated from length changes garnered from recaptured fish and expressed as relative and absolute annual growth. However, because fall gill netting captures predominately male fish analysis of growth and condition data are restricted to mature male lake trout.

In FY 2023, a total of 236 lake trout were captured: 117 within Quabbin Reservoir and 119 within Wachusett Reservoir, of which 106 and 111 were tagged, respectively (Table F 3). Growth rates from recaptured lake trout continue to indicate that these fish grow very slowly. Over the past 10 years, lake trout grow on average 7.5mm and 11.5mm a year in Quabbin and Wachusett reservoirs, respectively.

Table F 3. Quabbin and Wachusett reservoir lake trout tag-and-recapture data from 2006 to 2021

Quabbin Reservoir				Wachusett Reservoir		
Year	**Tagged**	**Recaptured**	**Total**	**Tagged**	**Recaptured**	**Total**
2006	279	NA	279			
2007	55	2	57			
2008	102	7	109			
2009	178	13	191			
2010	147	30	177			
2011	6	0	6			
2012	0	0	0			
2013	238	16	254			
2014	276	14	290	110	NA	110
2015	366	32	398	155	6	161
2016	286	32	318	64	3	67
2017	158	29	187	74	9	83
2018	133	30	163	66	5	71
2019	146	23	169	156	6	162
2020	94*	N/A	94	114*	N/A	114
2021	81	8	89	127	7	134
2022	106	11	117	111	8	119
Total	2557	247	2898	863	44	1021

* Lake trout were measured for length and weight only, not tagged.

Quabbin lake trout length at catch and condition had remained relatively stable for the last 4 years but dropped significantly in 2021. Over the long term, mean length at catch and relative condition have declined from historical highs in the 1970s but within decades oscillate regularly (Figure F 3 and Figure F 4). Interdecadal oscillations in these measures are likely a function of changes in forage fish abundance within Quabbin Reservoir, specifically Rainbow Smelt. For example, one qualitative measure of forage fish abundance decreased 10-fold between 2009 and 2011, which corresponds to a dramatic swing in lake trout relative condition during that time. Similar patterns observed in the number of landlocked salmon submitted to the Sportfishing Awards Program suggest this species responds to forage fish abundance as well. This decline in length at catch and condition observed in 2021 is likely the inflection of another cycle in these metrics which tend to recycle every six to eight years. The overall decline in lake trout size at capture and condition across the period of record is likely a result of a combination of factors including declining reservoir productivity, reductions in rainbow smelt densities potentially born through anthropogenic alterations to spawning strategies and increasing lake trout densities.

Within Wachusett Reservoir, lake trout length at capture and condition remained stable relative to years past (Figure F 5 and Figure F 6). Tagging efforts began in Wachusett in 2014 and thus does not have the benefit of the long-term perspective witnessed in the Quabbin lake trout data which stretch back to the initial plantings in the 1950s.

Note the axis breaks in figures F 3 and F 4. Grey bars on secondary Y-axis depict the number of landlocked salmon submitted to the Massachusetts Sportfishing Awards Program over the same time interval that met minimum size requirements.

Figure F 3. Mean relative condition of male lake trout collected from Quabbin Reservoir from 1974 to 2022.

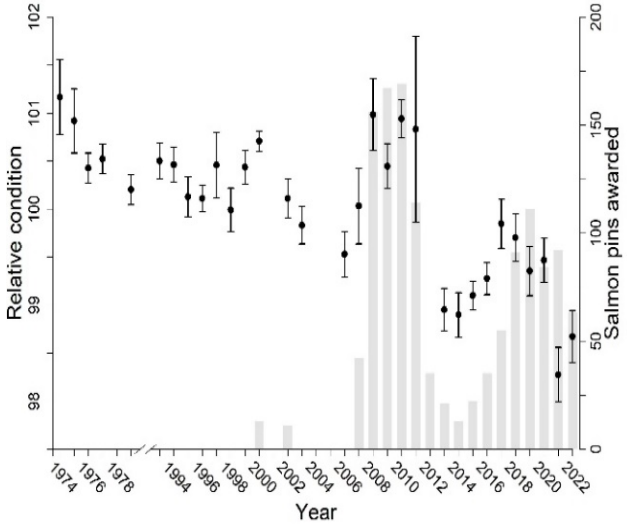


Figure F 4. Mean length (mm) at catch with sample sizes of male lake trout collected from Quabbin Reservoir from 1964-2022.

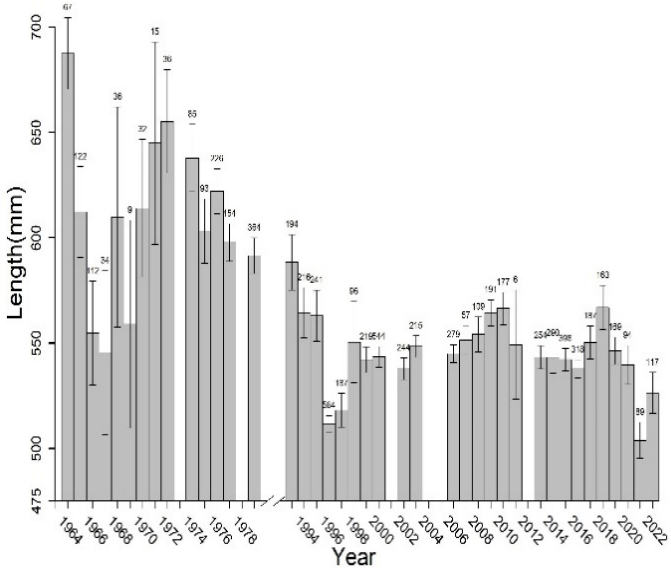
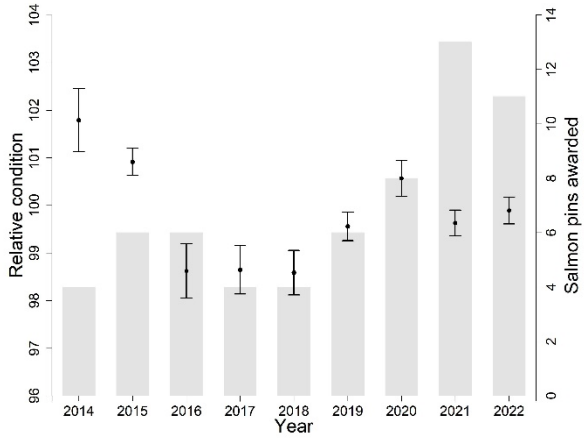
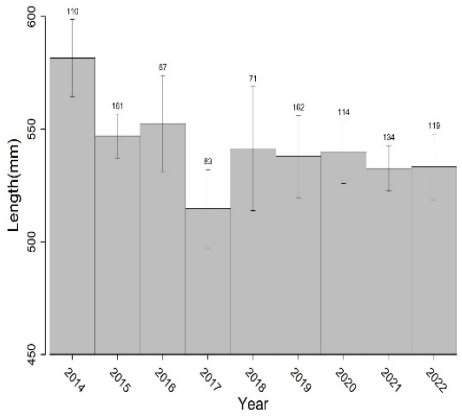


Figure F 5. Mean relative condition of male lake trout collected from Wachusett Reservoir, 2014-2022



Black points represent the mean relative condition. Grey bars on secondary Y-axis depicts the number of landlocked salmon submitted to the Massachusetts Sportfishing Awards Program over the same time interval that met minimum size requirements.

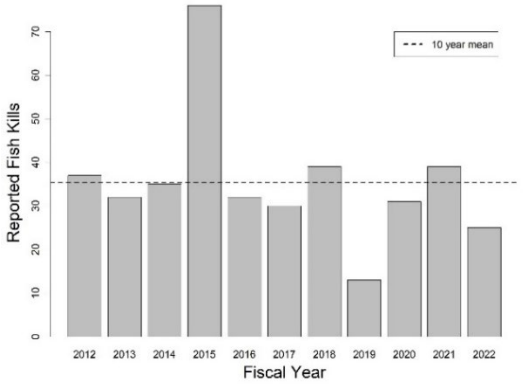
Figure F 6. Mean length (mm) at catch, with sample sizes, of male lake trout collected from Wachusett Reservoir, 2014-2022



Fish Kill Response

MassWildlife responded to 25 fish kills in FY 2023, which is below the 10-year average of 35 (Figure F 7). All of the reported kills were of natural origin and were caused by a mix of low dissolved oxygen, disease, and physiologically stressful behaviors, such as spawning.

Figure F 7. Number of fish kills reported to MassWildlife between 2012 and 2022



Fisheries GIS

The activities included in this project in FY 2023 were focused primarily on the development and enhancement of fisheries-related online mapping and data applications. These applications included the MassWildlife trout-stocked waters application, the pond maps/bathymetry viewer, and the web-based fishing application, GoFishMA!

Stocked Waters Application

In FY 2023 there was a continued effort to improve our trout stocking web application. The internal component, an online Google-based database, was designed to house annual stocking schedules, orders, and allocations in one repository. The information from this database automatically populates the public stocking list accessible on MassWildlife's website. The internal trout stocking database has eliminated much of the manually generated orders, lists, and emails that were previously used to create the same stocking orders and schedules.

Improvements to the online stocking application in FY 2023 included a review of all currently stocked waters by Westborough and District staff. The resulting revised lists were then included on both

the website and hard-copy lists circulated by the Districts. Every year there are a handful of waterbodies that are added or removed from stocking, usually due to issues of public access. The project leader also updated a spatial data layer for internal use that depicts trout stocking since the inception of the new stocking application in 2016. This GIS layer shows stocking efforts by species, numbers, and seasons. Biologists can use this information to better inform aquatic surveys and conduct management and protection efforts.

The web application on masswildlife.org/trout continued to garner a very positive reception from the public. For the periods of fall and spring trout stocking, from July 1, 2022 - June 30, 2023, the stocking application web pages received a total of 560,3845 unique page views (this excludes people logging in from state accounts). This figure is consistent with the usage from previous years (566,495 in FY 2022, 591,000 in 2021 and 500,599 in 2020). Users spent over 4 minutes on the page, which represents very positive engagement with the page content. The consistently large number of visitors to the trout stocking map/list page (it usually ranks in the top-5 list of most popular /mass.gov pages) indicates a continued appreciation of the application by the public.

Pond Maps/Bathymetry

In FY 2023 new bathymetric surveys were conducted of lakes and ponds across the state. MassWildlife began collecting new bathymetry in 2015, using the data to update publicly available pond maps as well as online web applications. In FY 2023 bathymetric surveys were conducted on the following seven ponds: Lovells Pond in Barnstable, Baldpate Pond in Boxford, Cheshire Reservoir in Cheshire, Jacobs Pond in Norwell, Laurel Lake in Lee, Newton Pond in Shrewsbury, and Maple Spring Pond in Holden. Digital depth maps for these ponds will be incorporated into the larger DFW bathymetry dataset during the annual data updates in winter, 2023.

Typically, between 5,000 and 40,000 depth readings will be collected during a bathymetry survey, depending on the size of the waterbody. Once new bathymetry data is collected, the point depths are analyzed in a GIS system, and subsequently output as a depth surface map. In FY 2023 Fisheries GIS recreated a statewide bathymetric datalayer for all the 237 lakes and ponds for which we had updated data. This seamless dataset allows users, within and outside of MassWildlife, to view depth information, including labeled contours, in one location, and is useful internally for field survey planning, and by the public for both angling and boating. The statewide bathymetry datalayer is also used as a base map in both our GoFishMA! and Pond Maps viewers, enabling users to access depth data on both a computer and phone. Recent statistics indicate that over half of the uses of our GoFishMA! application accessed it on a phone or other mobile device. Both applications allow users to show their location, so now users with a smartphone out on the water (or ice) can get real-time information on lake and pond depth.

These depth surface maps are also used in our Pond Maps and Fact Sheets, which are produced to provide lake and pond information for anglers, whether shore-fishing, ice-fishing, or out in a boat. The fact sheets, which describe fisheries resources, aquatic habitat, and recreational access, were updated based on the most recent sampling data, as well as information provided by the MassWildlife District Offices. New pond maps for Arcadia Lake in Belchertown, Cranberry Pond in Sunderland, Carbuncle Pond in Oxford, Crow Hills Pond in Princeton, and East Monponsett Lake in Halifax, were posted to the MassWildlife website in FY 2023.

The MassWildlife pond maps have been used frequently by the public and are usually accessed through the online pond maps interactive map and list. With the rollout of the GoFishMA! application, however, staff would like to simplify where the public can access information on waterbodies, so that pond maps and associated information will be accessed solely through the GoFishMA! application.

The current pond maps are static .pdf documents. In order to update information in the pond maps, the documents must be edited, the relevant maps attached, then reposted to the internet. To make this process more streamlined, staff are constructing standalone web pages for each pond. In addition to being able to easily edit information in the pages, staff will now be including photos of public access and other features of the waterbody. The new format will provide the public with more and more timely information on waterbodies. In the next Fiscal Years staff will also start creating the information pages for rivers and streams, creating a richer

experience for the public using the GoFishMA! application.

In FY 2023 the project leader created stand-alone printable .pdf maps from all the existing pond map pages, so that users will still be able to print out waterbody maps from the new interactive web pages.

Integral to this process was the cataloguing of existing pond maps and their status. We currently have 305 lake and pond maps available to the public. Of these 189 have been updated with new maps, including new bathymetry, and new writeups describing recent surveys and other habitat information.

The pond maps and new bathymetry are easily viewed by the public through the MassWildlife GoFishMA! application as well as the Pond Maps interactive map. There are now 200 lakes and ponds that have updated digital depth maps available to the public, through both the pond maps, and GoFishMA!

In addition to the pond maps and fact sheets available to the public, we also updated the GIS layer of bathymetry collected during our surveys. This data was made available to the public as both an interactive and downloadable GIS layer. The downloadable bathymetric contour layer allows users to display the data at 5-foot contour intervals and is available from MassGIS.

The interactive bathymetry layer is called 'Inland Waters Bathymetry' and is available through the MassMapper application at https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html

Online Applications

In addition to the Trout Stocking web application mentioned above, the Fisheries section maintains other online maps designed to guide the public to waters that offer good angling experiences and other recreational opportunities.

GoFishMA!

The web application called GoFishMA!, is the product of collaboration between the Fisheries section and our Information and Education section. The foundation of this online application is a layer of fishing sites, which is produced through input by both Westborough and District staff. This popular fishing web application is now available through MassWildlife's website, in the Freshwater Fishing section, at https://www.mass.gov/service-details/find-freshwater-fishing-spots

In addition to the fishing sites datalayer, the application currently includes shaded bathymetry for lakes and ponds, where available, links to pond maps and writeups, indications of trout-stocking, and access, including both shore access and boat ramps, and catch and release areas. Users can also get driving directions to a large number of sites, which will open Google Maps when someone click on a given site. While some access is obvious (e.g., boat ramp), other access needed local input from the District offices, especially for shore fishing areas and carry-in access. In FY2022 we accurately mapped the locations of vendors that sell bait to the public, to include in the GoFishMA! application In FY 2023 bait stores were added to the online map as an additional base layer. Users will be able to click on a bait store location and get driving directions as well as contact information for that store. Adding bait stores will provide users with an additional layer of information when searching for angling opportunities. In FY 2023 we continued acquiring photos that represent access sites mapped in the GoFishMA! Application. In the future iteration of the application, the public will be able to click on a site and get photos of the ramp or other access site, as discussed in Section2.

In FY 2023 we also conducted an analysis of the locations represented in GoFishMA! in relation to Environmental Justice (EJ) Communities. EJ Communities are primarily defined by three criteria: proportion of minority population, median household income, or household English language isolation. MassWildlife, under the direction of the Executive Office of Environmental and Energy Affairs, is making a concerted effort to include these criteria throughout our operations, especially in the information put out to the public. To that end, we worked with staff from the District offices to examine the locations in GoFishMA! to include more points that are easily accessible to EJ Communities. While this initial effort was limited to five sites per District, the effort will be an ongoing one throughout the life of the web application.

Pond Map Viewer

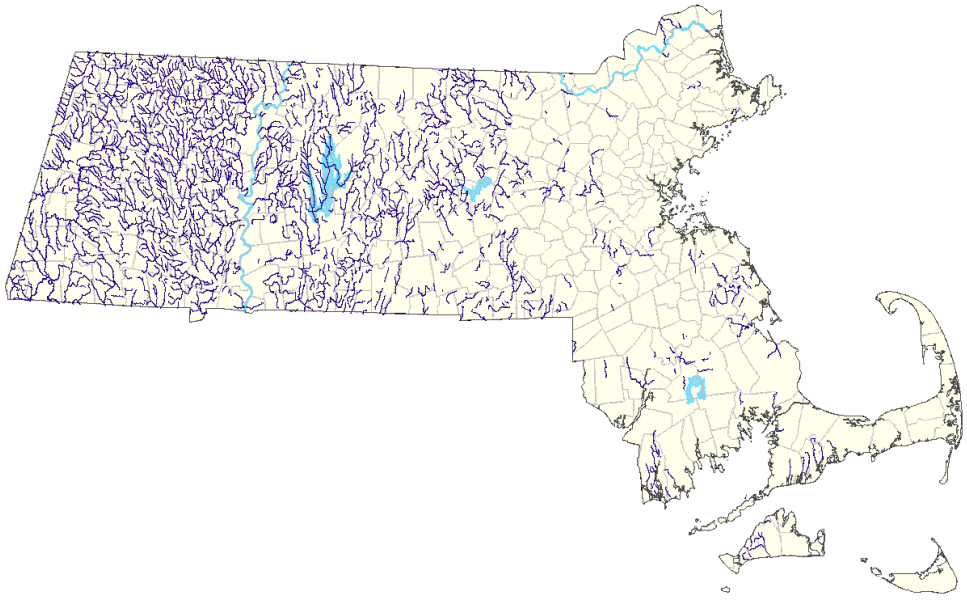
Another popular online map the Fisheries section maintains is the Pond Map Viewer page. It is a very simple, user-friendly web application showing ponds where fact sheets/maps and digital bathymetry are available. As updated pond descriptions and bathymetry are available, they are posted to the application.

Coldwater Fisheries Resources

Once a year, Fisheries GIS updates the Coldwater Fisheries Resource (CFR) datalayer available to the public (Figure F 8). CFRs are important habitat for a number of coldwater species, including trout. Coldwater species are typically more sensitive than other species to alterations to stream flow, water quality and temperature within their aquatic habitat.

Once fish sampling data, collected annually by staff biologists and technicians, is filtered into the Fisheries Section database, the data points are tied to stream and pond segments represented in the National Hydrography Dataset (NHD). The NHD is a dynamic dataset, designed to be improved on an ongoing basis based on field surveys and imagery interpretation. Through the process of tying our sampling data to this dynamic NHD data, we can ensure that our derived datalayers, like Coldwater Fisheries Resources, are based on the best available information. The total number of CFRs in Massachusetts is now 1,277. The CFR data can be accessed by the public via a web viewer: https://www.mass.gov/info-details/coldwater-fish-resources It is also available for download via MassGIS, for users that have access to a GIS mapping system.

Figure F 8. Current spatial representation of Coldwater Fisheries Resources (CFRs)



The Coldwater Fisheries Resource data is also used internally to produce a number of derivative data. These include the Wild Trout Classification data, which depict the best remaining waterbodies that hold reproducing wild trout. Also spatially based on the CFR data is the Coldwater Refugia dataset, showing those critical coldwater habitats where CFR-dependent species can survive high temperatures, drought, and other unsuitable conditions.

Fisheries Agency Collaboration

In FY 2023 the Fisheries section contributed general GIS support to MassWildlife, with emphasis on the updating and support of aquatic data. Fisheries GIS is part of the National Hydrographic Dataset (NHD) network, and in FY 2023 participated in collaborative working groups on the direction of hydrographic data development as well as adding new, field-verified streams that were incorporated into the national data. Since the NHD data were originally developed at a 1:24k scale, many smaller streams are missing from the data, some of which may be of

conservation concern. As MassWildlife samples these new streams, they may be incorporated into the national data, providing better protection for these resources. Future iterations of the NHD data will be based on terrain-modelled hydrography, which should include significantly more smaller streams. MassWildlife will be involved in the evaluation of these data and the new, finer-scale data should increase the accuracy of all of the products Fisheries releases to the public, and uses for analysis and habitat and land protection efforts.

In FY 2023 Fisheries GIS was able to take much of the Fisheries-specific data we produce and maintain it in an online portal called ArcGIS Online. ArcGIS Online is a web-based platform built by ESRI, our GIS software provider, designed to promote collaboration and seamless desktop to web publishing.

In the last several years we have sought out innovative ways to host our Fisheries data so staff can access, update, and edit it from a variety of locations. This was a good opportunity to identify data critical to the Fisheries workflow, including both Field Headquarters and District staff. To accomplish this, we created a Fisheries-specific section in ArcGIS Online for our spatial data. Accounts were then created for all of our users, and they were trained in accessing and editing this data. This investment will be valuable moving forward not only to streamline the fisheries section workflow but also to incorporate our data in intra-agency efforts that share our same priorities.

Hatchery/Trout Program

Trout Production and Stocking

The total number and pounds of each size category for each species of trout produced and stocked by MassWildlife's five hatcheries in FY 2023 are listed in Appendix A, Table A 2 and Table A 3, respectively. Overall, a total of 534,537 brook trout, brown trout, rainbow trout, and tiger trout with a combined weight of 418,379 pounds were stocked, which met the Division's annual trout production goal of 400,000 fish. Production was down slightly from previous years as a result of the drought conditions that the Commonwealth suffered during summer of 2022. The drought led to lower flows and warmer water temperatures at many of the hatcheries; these conditions required hatchery managers to cut back on feed and led to lower-than-normal growth for the summer months.

The production goal is based on the rearing capacity of each hatchery, which is determined by a combination of the quantity and quality of the water supply, rearing space and limits imposed by the National Pollution Discharge Elimination System permits that each hatchery is issued by the Massachusetts Department of Environmental Protection and the Federal Environmental Protection Agency. A second production goal of the hatchery trout program is for 50% of the fish that are stocked to be in the 12+ size category (average length of 12 inches). This goal was achieved in FY 2023 as well; 76% (407,980 fish) met or exceeded this goal, including 307,730 rainbow trout, 49,185 brook trout, 49,088 brown trout, and 1,977 tiger trout.

MassWildlife has both a fall and a spring trout stocking season. During the FY 2023 fall season, which ran from late September through mid-October 2022, 94 ponds and lakes, and 6 rivers and streams in 85 cities and towns across the Commonwealth's 5 Wildlife Management Districts were stocked. A total of 76,934 trout comprised of 26,917 14+ rainbow trout, 35,605 12+ Rainbow trout, and 4,000 9+ brown trout with a combined weight of 74,650 pounds were stocked. 81% of the fish stocked during the fall were in the 12+ or larger size category.

In the spring stocking season, which ran from March through early June 2023, a total of 457,603 trout with a combined weight of 343,729 pounds were stocked in 181 lakes and ponds and 196 rivers and streams in 239 cities and towns. Overall, 74% of the fish that were stocked met or exceeded the 12+ size category.

96% of the rainbow trout stocked (237,208) were in the 12+ category and 69% (169,996) were 14+ and weighed an average of 1 pound each. A few of the rainbows were over 16 inches long and weighed a pound and a half apiece.

A total of 78,503 brook trout were stocked in spring FY 2023, of which 49,185 (63%) were in the 12+ size category or larger. More than 600 brook trout longer than 14 inches with some individuals weighing more

than 2.5 pounds were stocked. The total poundage of brook trout stocked was 42,362 pounds.

A total of 129,270 brown trout between 9 inches and 18+ inches with a total weight of 66,385 pounds were also stocked. Thirty-eight percent (49,088) of the brown trout were at least 2½ years old and 12 inches or larger with an average weight of 1 pound apiece. Over 800 of these brown trout were longer than 18 inches and weighed as much as 4 pounds apiece.

Sandwich Hatchery produced 2,617 tiger trout which averaged 14+ inches and weighed an average of 1 pound apiece (Appendix A, Table A 2 and Table A 3. tiger trout are a cross between a brown trout female and brook trout male and are called tiger trout because of their striking tiger-like stripes.

Sandwich Hatchery obtained 13,200 2023 Shasta Strain rainbow trout Fry (17.2 lbs.) from the USFWS North Attleborough National Fish Hatchery. Sandwich Hatchery produced a total of 427,246 fertilized brown trout eggs (287,326 sent to Roger Reed Hatchery), 159,264 fertilized brook trout eggs and 245,728 fertilized tiger trout eggs in FY 2023 (Appendix A, Table A 4). During the spring season, the Sandwich Hatchery stocked a total of 804 brown trout and 319 brook trout surplus brood stock (Appendix A, Table A 2) with a total weight of 2,576 pounds and 582 pounds, respectively (Appendix A, Table A 3).

The Roger Reed Hatchery produced a total of 111,807 fertilized brown trout eggs and 706,660 fertilized brook trout eggs in FY 2023 (Appendix A, Table A 4). During the spring season, the Roger Reed Hatchery stocked a total of 679 brown trout and 745 brook trout (Appendix A, Table A 2) surplus brood stock with a total weight of 976 pounds and 1,141 pounds, respectively (Appendix A, Table A 3).

A small collection of eggs from each of 234 mated pairs, from both hatcheries, were retained as a future brood line. The resulting fingerling from these eggs were incubated separately from production eggs at the Roger Reed Hatchery and remain on station for egg production in 2025.

McLaughlin Hatchery obtained 54,163 2023 Shasta Strain rainbow trout eggs and 792,900 2022 Erwin-Arlee Strain rainbow trout eggs from the USFWS in FY 2023. McLaughlin obtained 314,737 2022 brown trout eggs and 310,341 2022 brook trout eggs from Roger Reed State Fish Hatchery. McLaughlin also obtained 70,000 2022 Soda Lake Strain brook trout eggs.

After hatching at McLaughlin, 120,338 brown trout (420 lbs.), 109,682 brook trout (508 lbs.), 102,936 Erwin-Arlee Strain rainbow trout, and 15,000 Shasta Strain rainbow trout fingerlings were transferred to Sunderland Hatchery for grow-out. McLaughlin also sent 84,184 brown trout (378 lbs.), 42,799 brook trout (202 lbs.), 100,409 Erwin-Arlee Strain rainbow trout (433 lbs.), and 36,617 (167 lbs.) Soda Lake Strain brook trout fingerlings to Bitzer Hatchery for grow-out.

Landlocked Salmon Production and Stocking

The Roger Reed Hatchery produced a total of 12,800 landlocked Atlantic Salmon in FY 2023 (Appendix A, Table A 4). 3,010 of these salmon that weighed a total of 192 pounds were transferred in September 2022 to the New Jersey Division of Fish and Wildlife Hackettstown Hatchery in exchange for Northern Pike fingerlings. The remaining 9,800 salmon, which averaged 8.9 inches and weighed a total of 2,513 pounds, were stocked in Quabbin Reservoir in May 2023. Landlocked salmon eggs for the 2024 production lot were obtained from Enfield State Hatchery (Maine) as eyed eggs in February 2023. The egg source was a domestic strain of West Grand Lake salmon reared in Enfield since 2019. The resulting fish will remain on station for stocking in the spring of 2024.

Northern Pike Stocking

In September 2022, approximately 2,000 Northern Pike yearlings averaging 11.5 inches long were stocked in the Lake Quinsigamond system. The Northern Pike were obtained from the New Jersey Division of Fish and Wildlife's Charles Hayford State Fish Hatchery in Hackettstown.

Fish Health Monitoring

MassWildlife has maintained an active fish health monitoring program for its five hatcheries since the 1980s. In that time, the MassWildlife's Fish Pathologist has conducted a comprehensive annual fish health examination of each species of fish at each hatchery, following the protocols of the American Fisheries Society and the Northeast Fish Health Committee (NEFHC 2015). MassWildlife is an active participant in the NEFHC. The fish are

screened for fish pathogens that the NEFHC committee considers a risk to trout and salmon (NEFHC 2015). In addition, diagnostic examinations were performed as needed on any hatchery fish that exhibited symptoms of illness.

Results of the fish health inspections and diagnostic testing conducted in FY 2023 are in Appendix A, Table A 5. No NEFHC listed pathogens were diagnosed in FY 2022. Coldwater disease (*Flavobacterium psychrophilum*; CWD) was diagnosed in the Erwin/Arlee and Shasta strains of rainbow trout at McLaughlin Hatchery and the Erwin/Arlee strain at Bitzer Hatchery (Table A 5). CWD is a ubiquitous pathogen of trout throughout much of the United States, but it is not listed by the NEFCH (NEFCH 2015). The CWD-infected rainbow trout at McLaughlin Hatchery were successfully treated with a Food and Drug Administration-approved antibiotic for CWD that was prescribed by a veterinarian in accordance with the Food and Drug Administration's Veterinary Feed Directive (VFD). The CWD-infected trout at Bitzer Hatchery were not treated and the infection resolved as the water temperature increased. Bacterial gill disease was detected in the Sandwich and Soda Lake strains of brook trout at McLaughlin Hatchery. Bacterial gill disease is also a ubiquitous pathogen and is an NEFCH nonlisted pathogen. The Bacterial gill disease-infected trout were successfully treated with sodium chloride.

Capital Improvement Projects

MassWildlife was awarded $60,000 in capital funding in FY 2023 for infrastructure improvements at hatcheries to improve efficiency and maintain our overall coldwater fish production goals.

Hatchery capital projects conducted in FY 2023 included:

McLaughlin Hatchery: $60,000 replace roof shingles on entire hatchery building.

Roger Reed Hatchery: $818,000 in the construction contract and $148,000 in construction administration and observation by Tighe and Bond to repair/replace the hatchery reservoir dam and reservoir water supply pipeline. This project was funded through the annual $1.5M in capital funds directed to DFW for dam repair and removal.

References

Northeast Fish Health Committee. 2015. Guidelines for Fish Health Management in Northeastern States. 67 pp.

MassWildlife-owned Dams

In FY 2023, MassWildlife received $1.825 million in capital funds to bring MassWildlife-owned dams into compliance with state regulations.

FY 2023 was marked by significant advancements with the completion of Roger Reed Hatchery reservoir dam and pipeline reconstruction in Palmer. This project is the fourth major project undertaken by the program, the second project in excess of $1 million, and the second dam rehabilitation, with the program's other two major projects being dam removals (Welsh Pond Dam and Putnam Pond Dam, both in Sutton). The Roger Reed Dam project used the majority of the FY 2023 funding.

In FY 2023, we also completed the design for the Adams Pond Dam reconstruction (Sutton), bid the project, awarded the contract, and began construction, with the cost of construction in FY 2023 of $725,000 (including $325,000 in surplus funds) and approximately $150,000 in engineering costs for design, permitting, bidding, construction administration, and observation.

MassWildlife also made significant progress on maintaining compliance and preparation for future projects by undertaking the following work:

- Mobilized a contractor and diver under emergency procurement rules to clear the blocked outlet to Threemile Pond Dam in Sheffield.
- Nye Pond Dam (Sandwich): Tighe & Bond prepared permit-level drawings for the partial removal.
- Developed permit-level drawings for the removal of Schoolhouse Pond Dam and prepared permit applications.
- White Island Pond Dam (Wareham): Began Phase II investigation for the rehabilitation project.
- Began a dam removal feasibility study for the removal of Cusky Pond Dam

- MassWildlife continued performing dam safety inspections as required, including:
- MassWildlife prepared annual updates of the Emergency Action Plans (EAPs) for its 10 Significant-hazard dams.
- Began compiling materials and background information to leverage ARPA funds for removal of 6 dams in future fiscal years.
- In late FY 2023 the agency was awarded ARPA funding to remove six MassWildlife owned dams. The funds will be available in early FY 2024 and the projects must be completed by the end of FY 2026.
    - Cusky Pond Dam Removal, New Braintree: $1,250,000
    - Schoolhouse Pond Dam Removal, Sutton: $775,000
    - Patrill Hollow Pond Dam Removal, Hardwick: $775,000
    - Arnold Pond Dam Removal, Sutton: $625,000
    - Thousand Acre Reservoir Dam Removal, Athol: $1,500,000
    - Salmon Pond Dam Removal, Brookfield: $325,000

Deerfield River Wild Brown Trout

In collaboration with Deerfield River Watershed Trout Unlimited partners

Background

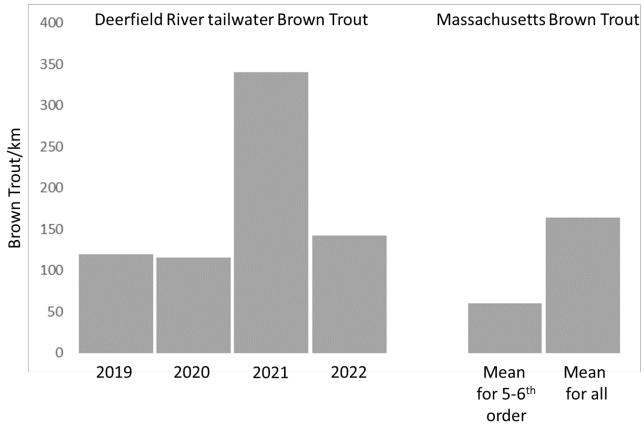
The Deerfield River tailwater in northwestern Massachusetts is the largest, and one of the most popular, river trout fisheries in the state. The current project was instituted several years ago in part to direct our management of this important fishery, as well as, in response to concerns that the current flow regime out of Fife Brook Dam was impacting the wild brown trout population.

We began this project in 2018 with marking all the brown trout that were stocked into this section of the Deerfield River with an adipose fin clip. This marking scheme was repeated for each stocking cohort through 2023 to distinguish hatchery from wild brown trout in our surveys. Beginning in 2019 we used raft electrofishing to do mark-recapture surveys across approximately 11 km of the Deerfield River tailwater downstream of the Fife Brook Dam. These surveys were designed to assess the relative proportion of wild and hatchery brown trout and to develop estimates of population abundance of brown trout in our study area. In addition to raft electrofishing, we used backpack electrofishing to survey 4 100-meter bankside transects to track the abundance of young-of-the-year brown trout more explicitly.

Results (to Date)

Through FY 2023 we have tagged 408 brown trout (>150 mm) and collected 452 in total. Of the brown trout collected over this period only 79 had an adipose fin clip, meaning that the brown trout fishery in the Deerfield River tailwater consists of over 82% wild fish is therefore a predominantly wild trout fishery. These results were somewhat unexpected given the relatively limited number of successful self-sustaining wild brown trout fisheries in Massachusetts and especially in the Deerfield River watershed.

Figure F 9. Brown trout mean abundance (number of brown trout per kilometer)



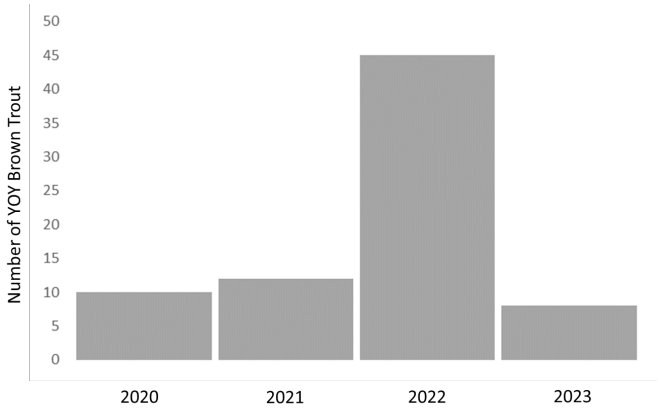
Mean abundance (number of brown trout per kilometer) for each of the first four years of Deerfield River tailwater surveys relative to mean abundance for all 5th-6th order brown trout streams (n=8) and all brown trout streams regardless of order (n=193). Data from 2023 are not included here because surveys were not complete at the end of the fiscal year.

Overall, abundance of brown trout has been somewhat lower than anticipated given the size and quality of habitat and the water temperatures present in the tailwater. Relative to wild brown trout populations in other similarly sized Massachusetts waters, as well as all wild brown trout waters of any size, abundance in the Deerfield tailwater is generally above the average (Figure F 9).

Young-of-the-year brown trout abundance in the Deerfield River tailwater has been exceptionally low in previous years of this project; however, we observed a four-fold increase in YOY brown trout in our 2022 surveys (Figure F 10). Looking back at the previous (2021-2022) fall and winter we observed that the flows in this section of the river were consistently higher, especially around spawning season October-November, than current required minimum baseflow (125 cfs) and were more in line with the new minimum baseflow requirements (250 cfs) set to begin in the next couple years. Although this is only one year of data and may be anomalous, it is at least encouraging that higher winter flows correlated with increased YOY brown trout survival. In the future the higher minimum baseflows required from Fife Brook Dam may allow the brown trout fishery to increase in abundance with better survival and recruitment but we do not know that yet. Young-of-the-year brown trout abundance returned to the level seen prior to the spike in 2022.

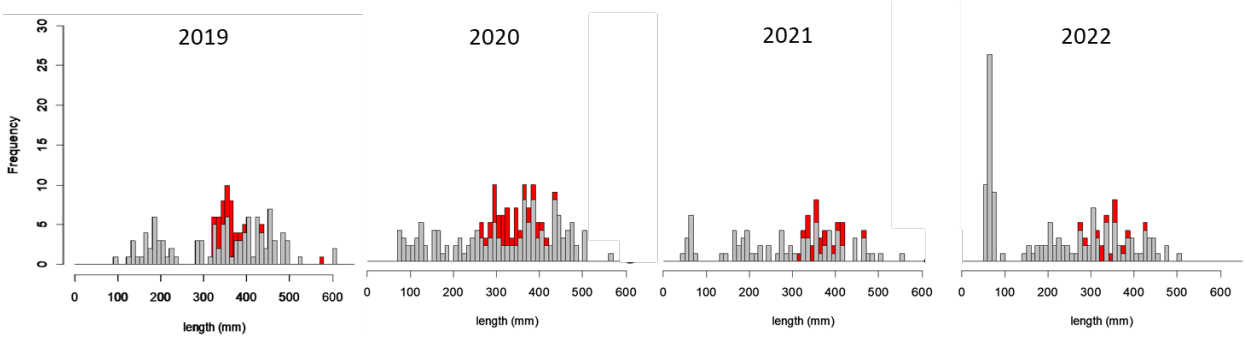
River flows during spawning season of fall 2022 were back to normal as well. In addition, record-setting high flows in early summer of 2023 may have contributed to lower YOY survival.

Figure F 10. Total number of young-of-the-year (YOY) brown trout from surveys in the Deerfield River tailwater 2020-2023.



Although recruitment appears to be limited by the low abundance of YOY brown trout (except in 2022), survival seems to be relatively consistent once individuals make it past their first year until they reach the limit of their longevity in the system (Figure F 11).

Figure F 11. Length-frequency of brown trout surveyed in the Deerfield River tailwater 2019-2022. Adipose-clipped hatchery brown trout are highlighted in red.



The first phase of this project is ongoing. Data from the first phase are already being used to direct our management of the fishery (e.g., brown trout stocking has been discontinued to emphasize the wild, self-sustaining brown trout fishery) and will be used as baseline data for later comparison purposes. The second phase will begin following the mandated shifts in flow regime from Fife Brook Dam (e.g., higher minimum baseflows over fall, winter, and spring, and ramping up and down of daily hydropeaking flows) likely in 2024. This second phase of the project will allow us to track changes in the brown trout population to assess the impacts of the modified flow regime.

Swift River

In collaboration with the Massachusetts Outdoor Heritage Foundation and Pioneer Valley Trout Unlimited

Wild Brook Trout movement and population dynamics

To expand our inquiry into the prolific and popular wild brook trout population in the Swift River tailwater, we recently proposed a more rigorous study using PIT (Passive Integrated Transponder) Tag arrays. PIT Tags are individually identifiable internal RFID (Radio Frequency Identification) transmitters that, in this instance, can be read continuously by several semi-permanent in-stream antennae placed at meaningful locations in the Swift River tailwater. One of the primary benefits of this approach over past mark-recapture efforts is the continuous data collection at the arrays, as opposed to prescheduled recapture events. Tracking fish individually rather than in cohorts will also allow for much more robust data analysis, including research into growth and survival. The project is in the initial planning stages, more information will be available in the coming years.

Figure F 12. PIT tag antenna array in the Swift River

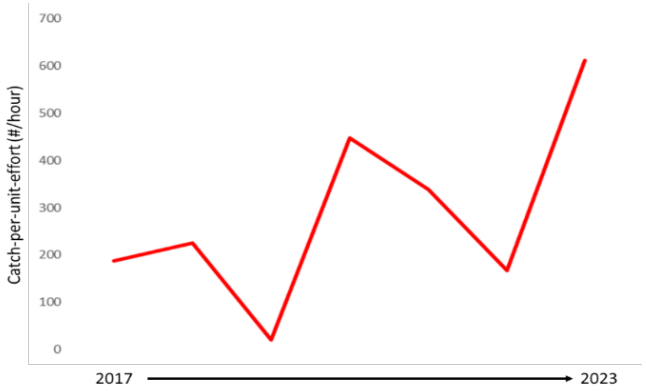
We received funding from the Massachusetts Outdoor Heritage Foundation and the Pioneer Valley Chapter of Trout Unlimited (PVTU) for this project and began work in spring 2023. With volunteer help from PVTU we have constructed and deployed two of the four PIT tag antenna arrays (Figure F 12).

No brook trout have been tagged and no data collected as of the date of this report. Supply chain issues have delayed our start and we are still waiting on some necessary tagging equipment to be back in stock. It is likely that we will be finishing up antenna arrays in fall 2023 and tagging fish in spring 2024.

Brook Trout Young-of-the-year (YOY) Surveys

We continued our standard four, 50-meter bankside transects, explicitly for brook trout YOY monitoring. Ongoing long-term tracking of YOY abundance can lead to insights into the dynamics structuring the wild brook trout population as a whole and tracking any concerning developments in the wild brook trout population such as consistently low recruitment. Similar to relative abundance measures for adult brook trout that we had seen in the previous 6 years of comprehensive fish surveys (2017-2022), YOY brook trout relative abundance fluctuates from year to year in the Swift River tailwater (Figure F 13). It appears that some trends are emerging (e.g., relatively low abundance followed by relatively high abundance) indicating a density-dependent driver of YOY abundance, as well as a general upward trend in abundance. More data are needed to show longer term trends and to identify potential influences, both density-dependent and density-independent, on Swift River wild brook trout recruitment.

Figure F 13. Relative abundance (catch-per-unit-effort; number of fish caught per hour of electrofishing) of young-of-the-year (YOY) brook trout in the Swift River tailwater, 2017-2023



Sucker Brook PIT-tag Project

(in partnership with Massachusetts DER and the Squann-a-tissit Chapter of Trout Unlimited)

Sucker Brook, a wild trout stream and coldwater tributary to the Nissittisit River in northeastern Massachusetts, has become a major focus for whole stream restoration through multiple dam removals and culvert replacements facilitated by DER and local partners. We designed a project to quantify brook trout population dynamics in Sucker Brook, as well as assess brook trout movement throughout the system as both thermal and physical barriers are removed. To do this we will use PIT tags to tag individual brook trout and use mark-recapture surveys and strategically placed PIT tag antenna arrays to quantify population metrics and assess longitudinal movement, respectively. This project is being funded by Massachusetts DER and Massachusetts MET.

At the time of this report, we have used all of the DER funding to purchase most of the equipment and supplies needed to build three PIT tag antennas for Sucker Brook. We are still waiting on MET funding to purchase the remaining items needed before this work can proceed. Unfortunately, we are also running into the same supply chain issues as in the Swift River project. Further work on the Sucker Brook project will likely continue over the winter and into spring 2024.

Wild Trout Stream Surveys

In collaboration with Massachusetts DER

In FY 2023, there were approximately 112 individual electrofishing surveys on 84 wild trout streams spread across the five Districts. Many of these were done solely by District staff as part of the annual survey priorities list, while the project leader was involved with other surveys that 1) were done in conjunction with DER as part of ongoing monitoring for dam removal and culvert replacement projects, 2) were done in conjunction with the Southeast District as part of long-term monitoring projects or before/after restoration monitoring projects for sea-run brook trout, or 3) were done in conjunction with district staff as part of the Wild Trout Management Plan call for assessment of “Premier” wild trout streams.

Teaching with Trout

Participation in the Teaching with Trout program rebounded to above pre-pandemic levels with 102 teachers participating and maintaining 83 tanks at 64 schools in the 2022-2023 school year. Approximately 15,600 eyed eggs were provided to the various schools and organizations for the program. Staff continued with a virtual rather than in-person orientation in FY 2023. A virtual orientation held in the evening is more effective because more teachers can attend.

The teacher’s manual for the program was updated by the Hatchery staff in FY 2023, and funding was received from the Massachusetts Outdoor Heritage Foundation to purchase an additional three water chillers to loan to teachers who want to participate in the program but are unable to secure the funds for this particularly expensive piece of required equipment.

Collaborations and Agency Representation

MassWildlife continued to collaborate with other agencies and outside groups on several efforts, including 1) as a member of the Massachusetts Drought Management Task Force, 2) as a member of the Eastern Brook Joint Venture updating the Massachusetts portion of their range-wide brook trout distribution map and assessing restoration proposals for funding, 3) working with Native Fish Coalition on an holistic assessment of Trout Brook in Dover (with future restoration work to be discussed this winter), 4) as a Coldwater Fisheries consultant for Water Management Act permit renewals, and 5) as an environmental reviewer for projects that take place in, or near, coldwater fisheries throughout

Massachusetts. I was also interviewed for an article in the Boston Globe on the Swift River trout fishery.

In FY 2023, MassWildlife staff gave several presentations to the following organizations where wild trout management; coldwater fisheries conservation and management; and the Deerfield River, Swift River, and Sucker Brook projects were the central themes.

Trout Unlimited (Deerfield River Chapter, Pioneer Valley Chapter, Squann-a-Tissit Chapter)

Berkshire Environmental Action Team

Native Fish Coalition

United Fly Tyers

Nashua River Watershed Association

Metacomet Land Trust

MassWildlife staff also attended the Wild Trout Symposium in September 2022, where staff had the opportunity to present our Deerfield River wild brown trout research and to learn more about wild trout management from biologists and researchers working throughout North America.

Other talks on specific subjects were provided to the following events and organizations by Fisheries staff:

Pioneer Valley Trout Unlimited, Easthampton

Kestrel Land Trust, Zoom

Envirothon, Blackstone River Heritage Park

In addition, Fisheries staff provided a number of talks and demonstrations in FY 2023, including conducting electrofishing demonstrations for students at Worcester State University and the University of Massachusetts and in conjunction with the Massachusetts Department of Transportation as part of its Rivers and Roads Initiative.

Connectivity and Migratory Fish

Westfield River Fishway

During 2022, the Westfield River Fish Ladder, located at the A&D Hydroelectric Dam in West Springfield, MA, was watered April 1—July 1, 2022. The fishway was not staffed with technicians as it was in previous years. For the fourth year, fish passing by the observation window were digitally recorded and enumerated from video footage. Motion detection video was in operation 24 hours a day with the aid of a near-infrared camera and infrared illuminator.

Anadromous Fish

The total shad count for 2022 was 1,297 fish. 50% of the 2022 American Shad passage had occurred by May 15 (Table A 6). The 2022 season marks the lowest passage year for shad since 2005 (Table A 6).

Non-anadromous Fish

Sea lamprey, white sucker, trout, and smallmouth bass (SMB) were observed passing upstream through the West Springfield Fish Passage Facility in 2022. Yearly totals for these species were 616 (sea lamprey), 824 (white sucker), 11 (trout), and 196 (SMB; Table A 6).

Connectivity and Monitoring

The Connectivity Biologist identified the Salmon Brook Restoration Project within the Quaboag WMA as a potential habitat restoration project that would improve stream quality and native fish populations and movements. The project involves removing a small, non-jurisdictional dam, removing an old stone crossing, and restoring a 40-foot section of stream bank (Figure F 14). In Fall 2022, MassWildlife was awarded $200,000 in In-Lieu Fee funds to complete the Salmon Brook Restoration Project. The goal is to complete the project by summer/fall 2025.

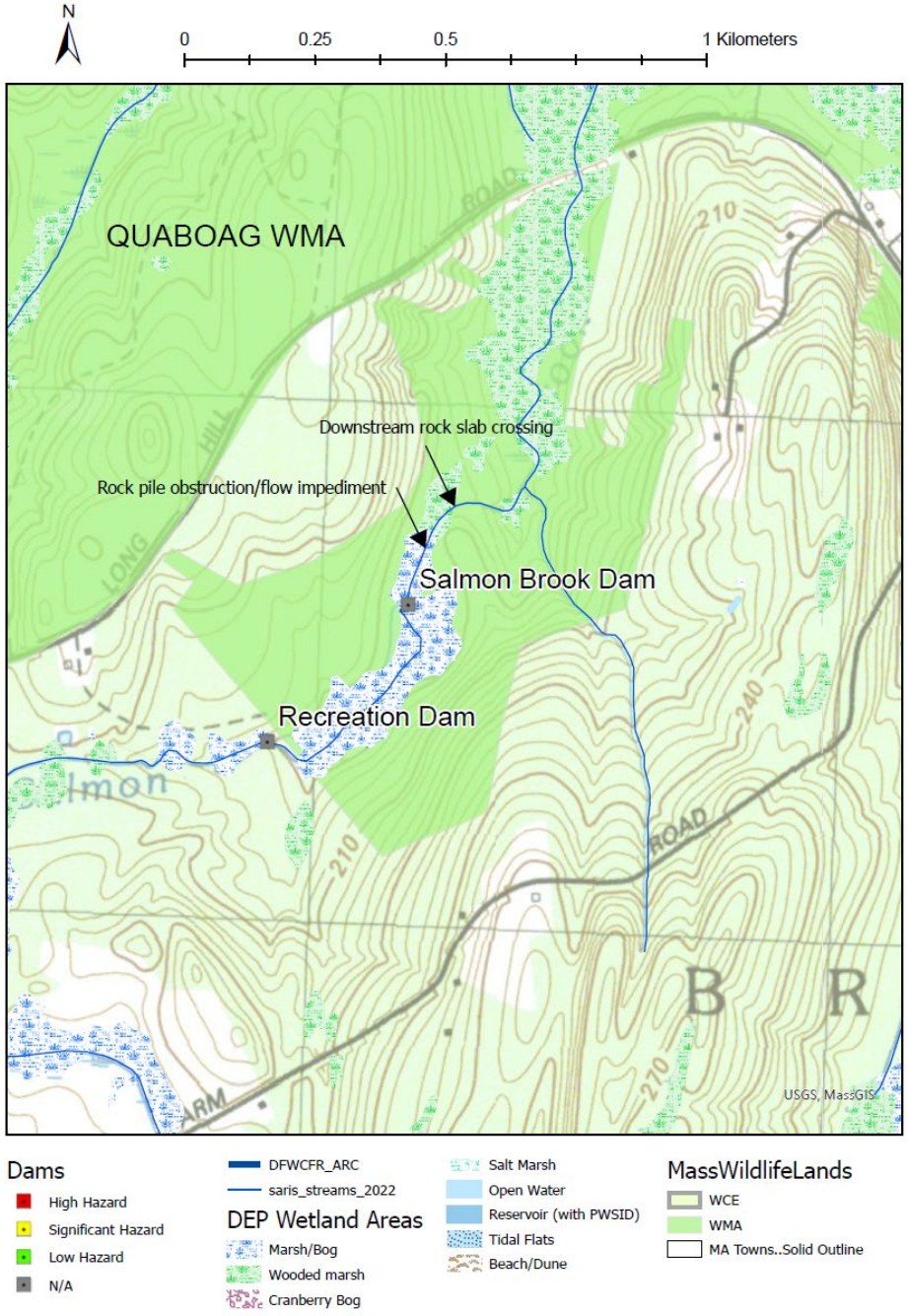
Taunton River

The Connectivity Biologist has been working with the Division of Marine Fisheries and United States Fish and Wildlife Service to stock larval American Shad in the Taunton River. The Connectivity Biologist began monitoring for shad in June 2023. Monitoring will continue for 11 years and will take place in early summer (for adult shad) and in the fall (for juvenile shad).

CRMA Grant Review Team

The Fisheries Outreach and Connectivity Biologist participated in the CRMA grant review led by the Division of Ecological Restoration (DER). Meetings were held in spring 2023 to discuss and rank project applications aimed at improving crossing infrastructure and aquatic organism passage.

Figure F 14. Map of Salmon Brook Project Area.



Outreach

Westfield River Fishway Open House

The Westfield River Watershed Association hosted the Westfield River Fishway and Dam Open House this year on May 21, 2023. The Connectivity Biologist staffed an informational table located on the causeway near the fishway and above the counting room and handed out various MassWildlife brochures and informational documents. The Connectivity Biologist answered questions about various aspects of the facility and anadromous fish life history and run status. The event was open to the public, and about 70-100 visitors toured the fishway facility during the open house.

Outreach Events and Sportsmen's Shows

The Connectivity Biologist participated in the New England Fishing and Boating Show, which was held Friday, January 27- Sunday, January 29, 2023. The Connectivity Biologist also exhibited at the Springfield Sportsmen's Show, which was held in West Springfield, Friday, February 24- Sunday, February 26, 2023. The Connectivity Biologist answered questions about fisheries and the agency, promoted angler outreach programs such as the Sportfishing Awards Program, and sold hunting and fishing licenses to customers.

Massachusetts Freshwater Sportfish Awards Program

A total of 1,875 bronze pins were awarded to participating anglers for fish caught in calendar year 2022 (Table F 5). The most popular category in FY 2023 was the Adult Catch and Release Category, which awarded 1,283 pins, followed by Youth Catch and Release (390), Adult Catch and Keep (100), and Youth Catch and Keep (95; Table F 4).

Table F 4. Approved pins during calendar year 2022, by category.

Category	Number of Pins
Adult Catch and Keep	100
Adult Catch and Release	1,283
Special Order	7
Youth Catch and Keep	95
Youth Catch and Release	390
Grand Total	**1,875**

The Freshwater Sportfish Awards ceremony, which celebrated and awarded pins to anglers who caught the largest fish in eligible species categories during the 2022 calendar year fishing season (Table F 6) was held on Saturday, March 11, 2023. The event was open to award recipients and their family members.

Table F 5. Approved bronze pins awarded in calendar year 2022 for the Freshwater Sportfishing Awards Program, by species.

Species	Number of Pins
Bowfin	15
Brook Trout	42
Brown Trout	59
Bullhead	39
Carp	106
Chain Pickerel	117
Channel Catfish	74
Crappie	187
Fallfish	15
Lake Trout	11
Landlocked Salmon	55
Largemouth Bass	354
Northern Pike	42
Rainbow Trout	46
Shad	16
Smallmouth Bass	154
Sunfish	251
Tiger Muskellunge	1
Tiger Trout	25
Walleye	12
White Catfish	79
White Perch	63
White Sucker	27
Yellow Perch	85
Grand Total	**1875**

Table F 6. Gold Pin winners for calendar year 2022, honored at the Freshwater Sportfish Awards ceremony held in March 2023.

Species	Category	Name		lbs	oz	length
Bowfin	Adult Catch and Keep	Dustin	Lewis	7	8	
	Catch and Release	Will	Pellerin			32"
Brook Trout	Adult Catch and Keep	Allan	Armstrong	3	5	
	Youth Catch and Keep	Noah	Silun	2	12	

Species	Category	Name		lbs	oz	length
	Catch and Release	David	DeSimone			19.75"
Brown Trout	Adult Catch and Keep	Tom	Nagle	10	0	
	Youth Catch and Keep	Logan	Middlebrook	3	6	
	Catch and Release	Christopher	Haycook			30.50"
	Catch and Release	Paul	Sawicki			30.50"
Bullhead	Adult Catch and Keep	Roger	Aziz, Jr.	4	12	
	Youth Catch and Keep	Carter	Flagg	2	0	
	Catch and Release	Roger	Aziz, Jr.			20.25"
Carp	Adult Catch and Keep	Neil	Mack	23	8	
	Youth Catch and Keep	Jack	Ostriker	23	4	
	Catch and Release	Kenneth	Langdon			40.75"
Chain Pickerel	Adult Catch and Keep	Daniel	Ross	6	9	
	Youth Catch and Keep	Owen	Vardakis	4	12	
	Catch and Release	Dominic	Lentini			28"
Channel Catfish	Adult Catch and Keep	Cam	Tucker	10	9	
	Youth Catch and Keep	Carter	Flagg	11	15	
	Catch and Release	Cam	Tucker			33.5"
Crappie	Adult Catch and Keep	Pao	Xiong	2	12	
	Youth Catch and Keep	Dominic	Crochier	2	4	
	Youth Catch and Keep	Tyler	Heyes	2	4	
	Catch and Release	Thomas	Melanson			17"
Lake Trout	Adult Catch and Keep	Loyd	Carney	12	2	
	Catch and Release	Colin	Duarte			30.50"
Landlocked Salmon	Adult Catch and Keep	Colin	Duarte	4	9	
	Youth Catch and Keep	Jack	Carney	4	0	
	Catch and Release	Colin	Duarte			26.75"
Largemouth Bass	Adult Catch and Keep	Mike	McGorty	8	10	
	Youth Catch and Keep	Logan	Nuy	6	6	
	Catch and Release	Will	Pellerin			25"
Northern Pike	Adult Catch and Keep	Nicholas	Ellsworth	18	14	
	Catch and Release	Jake	Burke			44"
	Catch and Release	Seth	Davis			44"
Rainbow Trout	Adult Catch and Keep	Tom	Nagle	8	7	
	Youth Catch and Keep	Gabriel	Christman	3	5	
	Catch and Release	David	DeSimone			24.75"
Shad	Youth Catch and Keep	Madolin	Allen	3	7	
	Catch and Release	Andrew	Langley			24.75"
Smallmouth Bass	Adult Catch and Keep	Pablo	Terron	4	15	

Species	Category	Name		lbs	oz	length
	Youth Catch and Keep	Nathan	Bessette	3	13	
	Catch and Release	John	Stamas			22.50"
Sunfish	Adult Catch and Keep	Aidan	Webb	1	3	
	Youth Catch and Keep	Liam W	Webb	0	13	
	Catch and Release	Dylan	Beard			11.25"
	Catch and Release	Raymond	Croteau			11.25"
	Catch and Release	Philip	Prieur			11.25"
Tiger Trout	Adult Catch and Keep	Shawn	Powell	3	5	
	Youth Catch and Keep	Liam W	Webb	2	14	
	Catch and Release	Anthony	Tomaso			21"
Walleye	Adult Catch and Keep	Edward	Brozo	7	0	
	Youth Catch and Keep	Colten	Andras	5	0	
	Catch and Release	Michael	Taylor			29.50"
White Catfish	Adult Catch and Keep	Edward	Lemieux	6	6	
	Youth Catch and Keep	Jack	Belben	4	11	
	Catch and Release	Jason	Wingrove			23.25"
White Perch	Adult Catch and Keep	David	Nelson	3	2	
	Youth Catch and Keep	Gabriel	Christman	1	4	
	Catch and Release	John	Ceccolini			18"
Yellow Perch	Adult Catch and Keep	Matthew	Power	1	14	
	Youth Catch and Keep	Elizabeth	Krzyzewski	1	12	
	Catch and Release	Jeremy	Hastings			16"

Fisheries Program Staff

Westborough Field Headquarters
Todd A. Richards, M.S., Assistant Director, Fisheries
Adam Kautza, Ph.D., Coldwater Fishery Resource Project Leader
Steven Mattocks, M.S., Fisheries Operations/Aquatic Connectivity Biologist
Rebecca Quiñones, Ph.D., Stream and River Project Leader
Caleb Slater, Ph.D., Hatchery System Supervisor
Jason Stolarski, Ph.D., Watershed Project Leader
David Szczebak, M.S., Fisheries GIS Project Leader
Brian Fay, Seasonal Technician
Steven Humphries, Seasonal Technician

McLaughlin Hatchery
Kurt Palmateer, Manager
Jennifer Ayre, Fish Pathologist
Mark Coughlin, Technician
Jeremy Davis, Technician
Jeremy Jachym, Technician
Christopher Marsden, Technician
Jacob Rawlings, Technician
John Sousa, Assistant Manager
Chet Thomas, Assistant Manager

Montague (Bitzer) Hatchery
Holly Hubert, Manager
Ryan Cleveland, Technician
Brian Guerin, Assistant Manager
Chester Hall, Technician
Joseph Kendall, Technician

Palmer (Roger Reed) Hatchery
Daniel Marchant, Manager
Kevin Magowan, Assistant Manager
Cameron Young, Technician

Sandwich Hatchery
Adam Davies, Manager
Michael Clark, Technician
Gregory McSharry, Assistant Manager
Keith Wernert, Technician

Sunderland Hatchery
Chuck Bell, Manager
Megan Cruz, Technician
Kalina Flood, Technician
Sarah Lawson, Technician
Timothy Nye, Assistant Manager
Andrew Ostrowski, Technician

3 The Wildlife Program

Michael Huguenin, Assistant Director of Wildlife

Overview

The Wildlife Section's priorities are centered around the conservation and management of many of the mammal and bird species in Massachusetts not designated as rare. The Section is responsible for conducting research, and implementing conservation, and management strategies for wildlife populations throughout the Commonwealth of Massachusetts, Further, the Wildlife Section works to enhance wildlife-based recreation and to reduce negative interactions between people and wildlife. The Section is led by the Assistant Director of Wildlife Research and consists of 16 staff: seven Game Biologists, one Community Response Biologist (new), one Population Ecologist/GIS Specialist, one Ornithologist, and five Habitat Biologists under the supervision of the Habitat Program Supervisor.

We accomplish our goals by conducting research; consulting with internal and external experts; and utilizing the best available science to develop and implement management strategies, such as setting regulations, conducting public surveys, outreach and education efforts, evaluating wildlife population status, implementing habitat management practices, acquiring land, etc. Specifically, Game Biologists (4 Project Leaders and 3 Wildlife Biologists) in the Wildlife Section are responsible for the management and conservation of most of the mammal and bird species, including but not limited to black bear, white-tailed deer, wild turkey, waterfowl, cottontail rabbit, furbearers, woodcock, ruffed grouse, raptors, and moose.

Wildlife Section biologists develop, conduct, and maintain research projects in collaboration with staff from our five district offices, and in collaboration with partners such as, the USGS Coop Unit at UMass Amherst, universities, NGOs (Mass Audubon, The Nature Conservancy, The Trustees), regional partners, other state agencies, municipalities, etc. Section biologists utilize the information they collect through monitoring and research efforts in combination with the best available science to develop management strategies. Section biologists employ adaptive management strategies to conserve, protect, and manage wildlife populations to ensure those populations persist in perpetuity, and continue to provide benefit to the public. Habitat biologists in the Wildlife Section are responsible for developing and implementing habitat management on state Wildlife Management Areas (WMA) to maintain, enhance, and preserve biodiversity –of both game and nongame species— throughout the Commonwealth.

Habitat staff also uses the best available science, and collaborates with staff from across the agency, other agencies, and outside partners to develop habitat management plans and develop and promote best practices for managing habitat to benefit biodiversity. Habitat staff directly conducts management in the field as well as supervising contractors hired to conduct habitat management. Habitat staff also consult with private landowners on habitat management strategies, and spend significant time developing management and conservation strategies, consulting on land acquisition, and conducting public outreach.

Meghan Crawford began employment in February 2023 as the new Community Response Biologist (CRB). The CRB is responsible for maintaining and fostering working relationships with partners, municipalities, farmers, and the public to promote relevant programs. Also, the CRB is responsible for assisting with outreach and communications for the Wildlife Section. Wildlife Section staff also coordinate the Large Animal Response Team (LART), response to human-wildlife conflicts, the agency's pheasant stocking program, and permitting for falconry, crossbows, and problem animal control, partner with federal, state, municipal and private organizations, represent the agency on the Northeast Association of Fish and Wildlife Agencies' various technical committees and the Northeast Association of Wildlife Administrators. Staff also provide presentations to the public, fulfill public records requests, and conduct media interviews.

Habitat Program

Overview

FY 2023 set another record for acres of habitat managed with prescribed fire by the MassWildlife Prescribed Fire crew, exceeding FY 2022 by over 100 acres despite challenging weather conditions. Invasive control acres were down, primarily due to a difficulty getting qualified vendors to bid on larger projects and increased costs when bids were successful.

Staffing

The Habitat Program staff at the conclusion of FY 2023 included the habitat program manager, five habitat biologists from MassWildlife's Wildlife Section (not including one position left unfilled after promotions), as well as the Prescribed Fire Program Manager and three restoration ecologists from the Natural Heritage and Endangered Species Program (NHESP).

Project Administration

Habitat Program staff administered, contracted, and directed biological monitoring, management planning, and applied management practices at over 30 sites in FY 2023 to help achieve landscape composition goals for a spatial and temporal diversity of habitats at the landscape level. Activities included preparation and/or updating of habitat site plans and prescribed burn plans, administration of habitat management contracts with private vendors, and conducting or contracting biological monitoring. Habitat Program staff also maintained GIS databases of management and monitoring data for all sites.

Habitat Management Practices

Nearly 3,000 acres were treated with one or more management practices and/or monitored across 32 different sites by Habitat Program staff and contractors in FY 2023 (Appendix B, Table B 1 through Table B 6).

Prescribed Fire

MassWildlife engaged in prescribed fire activities on 12 wildlife management areas in FY 2023. A total of 32 prescribed burns occurred on our WMAs and 1,446 acres were successfully treated with prescribed fire from September 2022 through June 2023. See Table B 5 for more details regarding the schedule of prescribed fires, habitats targeted, and acres burned. Prescribed burns were carefully timed and sequenced with other habitat management activities such as mowing, invasive species control, and forestry operations to maximize the effectiveness of these important treatments, and to reduce fuel loads and the potential for extreme fire behavior. Prescribed burns were also carefully planned and timed to meet ecological objectives, avoid impacts to sensitive wildlife and plants, and allow for hunting and seasonal recreational activities occurring at wildlife management areas. In many cases, only a certain percentage of available habitat received prescribed fire treatment, to accommodate multiple uses and protect sensitive species.

MassWildlife conducted field assessments and produced prescribed fire plans for WMAs across the state in FY 2023, bringing to 24 the total of WMAs with prescribed fire plans statewide and over 7,500 acres in prescription. This year, plans were updated or completed for sites statewide, including tracts within the calcareous wetlands of Berkshire County. All prescribed fire plans follow National Wildfire Coordinating Group (NWCG) and MassWildlife prescribed fire planning guidance. The planning involved field assessments and plan contributions by Districts, the Habitat Program, Natural Heritage ecologists, and experienced fire planners. These plans were produced by the prescribed fire project leader and technically reviewed by the MassWildlife prescribed fire manager. Plans provide details on management goals, fuel types, fuel loads, fire breaks, prescription parameters including smoke management, crew composition, burn logistics, and risk assessment and mitigation strategies.

MassWildlife updated Wildfire Response Abstracts for several wildlife management areas and shared these abstracts with DCR Fire Control district wardens and local fire departments in FY 2023. The Wildfire Response Abstracts are designed to provide pertinent information including detailed maps with location of key access points, internal road networks, infrastructure, and nearby water sources. The abstracts also identified contacts for site and fire management, and other information deemed necessary for response at the site. These abstracts are updated periodically to ensure local fire departments have updated information on access and contacts. A more detailed fire management plan

for the Tekoa Mountain WMA was initiated in 2022 and that project is planned for completion in 2024.

During the late summer of 2022, two qualified and available staff, Benjamin Mazzei of the Habitat Program, and Josh Freniere of MassWildlife's Connecticut Valley District office, participated in interagency wildfire mobilizations to Oregon, providing valuable service to our partners within the USDA Forest Service, U.S. Fish and Wildlife Service, National Park Service, Mass. Department of Conservation and Recreation (DCR), and western state partners, and gaining valuable skills for advanced prescribed fire positions.

To ensure personnel are qualified and use safe working practices while participating on prescribed burns, MassWildlife offered several trainings and workshops throughout FY 2023. MassWildlife jointly hosted and conducted an annual fireline safety refresher with DCR Fire Control in May 2023 for over 100 participants, including MassWildlife Prescribed Burn Crew, DCR Fire Control and Watershed staff, university students, and numerous volunteers.

The fireline safety refresher was offered virtually with online prework and a virtual live presentation, followed by fitness and fire shelter practices at six different locations around the state. Habitat and other staff served as cadre for this training and facilitated the successful completion of the refresher, fire shelter practice, and work capacity tests.

Additional trainings conducted during this period included equipment troubleshooting and maintenance, use of water on the fireline, and individual assessments of staff on the fireline for advancement with task books. The Prescribed Fire Project Leader and Prescribed Fire Program Manager participated as cadre for prescribed fire trainings at Camp Edwards in 2023. The Prescribed Fire Project Leader also participated in regional compact trainings related to wildland fire leadership in Rhode Island.

MassWildlife also provided technical prescribed fire assistance to fire management partners, including the DCR, the Buzzards Bay Coalition on Cuttyhunk Island, and Rhode Island DEM at its Arcadia WMA and Nicholas Farm WMA.

Technical Assistance and Coordination to Private Landowners

Private Lands Habitat Biologists contracted with NRCS conducted outreach and facilitated management planning and implementation on numerous ownerships. Most projects involved creation of young forest habitat or maintenance of shrubland habitats that support both declining songbirds and game species.

Staff participated in MassWildlife Habitat Management Grant implementation, including designing the funding structure, reviewing grant announcement materials, contributing to web page content, receiving and coordinating staff response to inquiries for technical assistance from potential applicants, delivering technical assistance to potential applicants, serving on the ranking committee, and providing guidance while landowners conducted management activities. During FY 2023, 10 landowners received technical assistance.

Technical Assistance and Outreach Coordination with Other State Agencies

Habitat Program staff usually provide direct technical assistance to DCR by reviewing proposed harvesting operations on state forest lands across Massachusetts. In FY 2023, DCR's forest management program was on pause and no harvest proposals were forwarded to MassWildlife. In general, MassWildlife Habitat Program staff advocates for inclusion of young forest openings greater than 2 hectares (approximately 5 acres) to meet the needs of additional young-forest-dependent wildlife species, for retention of young ash trees in salvage and sanitation cuts, and for consideration of barrens and pitch pine-oak woodlands restoration efforts where appropriate.

In FY 2023, the Habitat Program also continued working with representatives from DCR, Ruffed Grouse Society, National Wild Turkey Federation, and Mt. Grace Land Conservation Trust on a coordinated outreach program for dynamic forest habitat management aimed at increasing the diversity of age classes and native species in Massachusetts forests, from biologically mature forest stands to regenerating young forest stands

Upland Game Program

Wild Turkey

Hunter participation

Hunting participation for wild turkey declined during FY 2023. In the fall of 2022, 4,080 fall-only turkey permits (turkey permit purchased after the spring season closed) were issued, the lowest number since 2014 (3,940) and an 11% decline compared to fall 2021. The spring 2023 season saw a decline in the number of turkey permits purchased, where 16,981 were sold; this represents the lowest number of turkey permits sold since 2010 and the lowest number sold since the beginning on online licensing in 2012.

Fall 2020 Harvest

New regulations promulgated during 2020 changed and expanded the structure of the fall season. Now, hunters have a 12-day fall wild turkey hunting season where shotguns and archery equipment were allowed in addition to either 4 weeks (Zones 1-9) or 6 weeks (Zones 10-13) of additional archery-only fall turkey hunting.

A total of 230 wild turkeys were harvested during the fall season in 2022, which is the third-highest total since 1999. There were 118 female and 112 male wild turkeys harvested during the 2022 fall hunting season. The proportion of females harvested in 2022 was 51.3% and comparable to the 10-year average (53.8%). However, it is likely that due to the difficulties of sex identification of juvenile turkeys in the fall, some hunters may not accurately report the sex for fall-harvested turkeys.

Archery hunters (including crossbow under special permit) continued to contribute a significant portion of the total harvest, accounting for 54.4% of the total fall harvest; this was the third year in a row where the archery harvest accounted for greater than half of the total fall harvest. A large portion of this archery harvest can likely be attributed to archery deer hunters who are opportunistically harvesting turkeys, particularly since 2020 when expanded archery-only seasons were implemented that provided an additional 4-6 extra weeks of archery-only fall turkey hunting. Survey data indicates that approximately 50% of fall turkey hunting occurs concurrently with archery deer hunting. The high prevalence of archery harvest during the fall season and the substantial amount of fall permits issued indicates continued high demand for fall turkey hunting opportunities.

Hunter participation, weather conditions, and food availability may all influence the fall turkey harvest. Overall turkey population size, distribution, and particularly poult production and survival during the preceding summer months are factors that also greatly influence fall wild turkey harvest.

Spring 2023 Harvest

The 4-week spring wild turkey hunting season occurred from April 24–May 20, 2023. A total of 2,965 wild turkeys were harvested during the regular spring season, the third-highest spring turkey harvest ever in Massachusetts. The strong spring season harvest occurred despite the fewest number of turkey hunters since 2010.

In spring 2023, harvest was highest in Worcester (n = 735), Franklin (n = 454), and Berkshire (n = 389) counties. Bearded hens perennially account for less than 1% of the total spring wild turkey harvest; 11 hens were reported during the spring season. Approximately 2.58 adult turkeys were harvested per juvenile male turkey, a rate considerably lower than in recent years.

Spring turkey hunters continue to increasingly make use of archery equipment; approximately 7.9% harvested turkeys with archery equipment in 2023; archery hunting for wild turkeys and other big game continues to be popular particularly in areas of eastern Massachusetts where many towns and properties will only allow archery equipment as an acceptable means of take.

Overall, wild turkey hunting opportunities remain excellent across the state, as the relatively high turkey population statewide continues to offer quality hunting experiences.

2023 Spring Youth Turkey Hunt

The annual mentored youth wild turkey hunt was held on April 22, 2023, on the Saturday immediately preceding the opening date of the spring hunting season. To participate, youths (ages 12-17) were required to complete a standardized training program and field exercise.

An estimated 257 youths received permits for the youth turkey hunt day. Youths harvested a total of 117 turkeys (46 immature male, 70 adult male, 1 bearded hen) on youth day, representing a success rate of approximately 45%. Youth success rates are typically greater than regular spring season hunter success rates, which average approximately 15%-17%.

Ruffed Grouse Drumming Surveys

To assess the statewide/regional abundance of ruffed grouse, a springtime survey to detect their conspicuous drumming sounds is conducted each year by MassWildlife staff. In 2023, 21 drumming survey routes were surveyed across the state. Numerous "constant zero" routes were not surveyed and consist of routes where no grouse had been recorded in 5 consecutive years. All routes were surveyed between April 15 –May 5. All constant zero routes occurred in either the Northeast, Southeast, or Central wildlife district. Two types of routes are surveyed, "random" routes are surveys randomly located in suitable habitat across the state, whereas "subjective" routes are ones that are intentionally placed in areas of high-quality habitat.

Overall, the average number of drums heard per route (the breeding grouse index; ANDR) on all random routes statewide has been slightly declining over the past several years; however, in 2023 the ANDR declined to 0.38. The ANDR in the Western District in 2023 was 0.42, which was lower than in the Connecticut Valley District (0.80 ANDR). Historically ANDR is highest in the western portions of the state.

The ANDR on subjective routes completed continued to decline (0.85 in 2023 compared to 1.3 in 2022). Grouse continue to be detected on subjective routes in the Southeast District and anecdotal observations still indicate grouse exist in the Northeast District; grouse are not widespread in these districts but can be locally abundant in areas with suitable habitat. It's possible that subjective routes that have been surveyed for decades are suffering from the eventual decline in habitat quality, particularly in light of increased drumming activity on random routes in 2022. Continued and renewed emphasis on young forest creation and management is critical to the long-term sustainability of grouse populations statewide. Although grouse populations are substantially lower than several decades ago, they remain abundant in heavily forested landscapes of central and western Massachusetts, particularly those areas where natural disturbance and/or active forest management results in the high-quality young forest habitat that is critical to the success of grouse and numerous of species of conservation need.

American Woodcock Singing-Ground Survey

Woodcock singing ground surveys are conducted from April 20– May 10 each year. Routes are all 3.6 miles long and consist of 10 stops that are surveyed each for 2 minutes. Survey routes are sampled approximately 15-22 minutes after sunset within the survey period and must be completed within 38 minutes.

Currently, there are 19 randomized singing-ground survey routes in Massachusetts. Of those, 9 were actively surveyed in 2023. The average number of woodcock heard peenting per route (including constant zero routes) in 2023 was 1.26, slightly below the 3-year average (1.32). Overall, woodcock are located statewide, and although most constant zero routes exist in the eastern portion of the state, numerous productive surveys are conducted in other developed landscapes.

The U.S. Fish and Wildlife Service publishes an annual report utilizing data from the Harvest Information Program (HIP) in addition to the Singing Ground Survey. Results from the 203 reports indicate an increase in woodcock harvest (2,800), but a decline in hunter numbers (600), and days afield (3,700).

New England Cottontail/Eastern Cottontail

Fecal pellet samples were collected from wild cottontail rabbits on 28 sites across areas of Barnstable, Plymouth, and Berkshire counties, January – April 2023. All areas were surveyed 1-2 times within a 3-week period with 0–20 samples collected per site. Approximately 355 samples were collected in total (269 collected in 2022); results (species identification) of the 2023 winter sampling period are still pending, but overwhelmingly most samples were collected from sites on Cape Cod (>90%), with an abundance of samples also prioritized within the Berkshire County survey area.

Live trapping of rabbits resumed in 2023 and occurred January 10—February 7, with the purpose of contributing founding rabbits for zoo-based husbandry as part of the New England cottontail

conservation initiative. Over that time, 18 cottontail rabbits were live-trapped in wooden box traps; 15 New England cottontail, 2 eastern cottontail, and 1 undetermined species were recorded during 234 trap-nights. Of those rabbits, 4 female New England cottontail were transferred to Roger Williams Park Zoo in Providence, Rhode Island, for inclusion in their captive breeding program.

Waterfowl Program

Wood Duck Nest Success Project

MassWildlife personnel conducted nest-box checks on 42 of the original 50 study sites used to monitor wood duck populations across the state. Some sites were discontinued because of habitat changes, including ponds drying up; because of the difficulty with boxes toppling over; and poor ice conditions for safe winter maintenance, perhaps due to global warming, or because of no use. The winter of 2021-22 was relatively mild. Wood ducks and hooded mergansers began nesting earlier than normal with some merganser nest initiated by late March. Overall box usage was 80%, down from 82% last year and 88% in 2021. However, wood duck success rate was 74%; 78% for hooded mergansers. There were 217 wood duck nesting attempts, of which 161 were successful, and 106 hooded merganser nest starts with 83hatches in the 404 available boxes. Wood duck use of boxes continues to decline in the western third of the state, with most box use being by hooded mergansers.

Canada Goose Population Trends

Resident Canada goose banding by roundups during their flightless molt occurred between June 8 and July 5. District and Westborough HQ staff banded 800 geese at73 sites in 63 municipalities from the Berkshires to Cape Cod. The total included 393 goslings and407 adults. Also captured were 137 previously banded geese.

Park Waterfowl Census

Every 5 years since 1973, the Waterfowl Project Leader and staff have conducted a survey of sites where waterfowl, primarily mallards, are fed. Park sites were defined as areas where people fed waterfowl and were located on both private and public property in urban, suburban, and rural areas on fresh, brackish, or salt water. The survey is ground-based with most counts may by MassWildlife staff, though in some cases reports by the public were incorporated into the agency count.

A total of 5,754 mallards, 126 American black ducks, and 2,383 Canada geese were counted on 114 sites in 80 municipalities where waterfowl were fed; 494 birds of other species of waterfowl were also recorded. Waterfowl numbers have been declining on this survey since the peak count of over 20,000 in 1993.

Pre-season Waterfowl Banding

The 2022 air-boating season was hampered by drought conditions similar to those of 2020. By August the entire state was in critical drought except for the Berkshires where it was considered only mild. Only 9 trips could be made and included 2 nights at Lackey Pond where the dam built with M.A.R.S. H. money from Ducks Unlimited allowed us to impound water. However, the Great Meadows NRW in Concord, our major airboating site, could not be boated due to low water initially, and then to the area completely drying up. Between July 27 and September, we only captured 423 birds, of which 414 were newly banded. The bulk of those were wood ducks (288) followed by mallards (95). See Appendix B, Table B 7 for details. We collected 54 oral and cloacal swabs for Avian Influenza sampling in western Massachusetts for the USDA's APHIS Wildlife Services.

Mallard Population Trends

In June we acquired a tub net launcher with funds donated by Ducks Unlimited, the Western Mass Duck Hunters Association, and the Waterfowl Project Leader and a drop-door trap at one site to band ducks at sites where they were used to being fed at 27 sites during 12 days of effort in our Northeast, Southeast, Central, and Connecticut Valley wildlife districts. We captured 205 mallards, 1 mallard x black duck, and 1 American black duck by those methods, along with 44 previously banded ducks.

Migratory Gamebird Hunting Regulations

During the period of September 1-24, Massachusetts conducted a statewide resident Canada Goose hunting season, with a daily bag of 15. Duck-hunting seasons in the Atlantic Flyway continued with the liberal option of 60-day seasons and a six-bird bag

limit. The Canada Goose season was 60 days with a two-bird daily bag limit in the Central and Coastal waterfowl hunting zones as we have moved into the moderate hunting season package for North Atlantic Population (NAP) geese and a restrictive season of 30 days with a one-bird bag limit in the Berkshire Zone for Atlantic Population (AP) geese.

During the period January 15–February 11, 2023, Massachusetts held a late, resident Canada goose season in the Central Zone while the season ran January 31–February 15 in the North Coastal Zone with a five-bird daily bag in each zone.

American Black Duck and Mallard GPS Study

Beginning after the duck hunting season closed in late January and into February, our agency participated in the second year of a three-year study using GPS-ACC tracking units on hen American black ducks to monitor movements, timing of migration, and nesting efforts and success. Previously we participated in a pilot study on black ducks last winter, deploying 3 units. This year we were assigned 9 devices for black ducks plus had 3 units retrieved from mortalities last year.

All the black duck devices were placed on hens wintering in the Southeast District. Units from hens that experienced winter mortality were retrieved and placed on additional hens. All the devices functioned and are being tracked by researchers with the University of Saskatchewan.

During the course of the black duck capture efforts, 72 black ducks and 6 black-plumaged hybrids were banded while 22 previously banded birds were also handled.

The bulk of postseason banding of wintering ducks concentrated on mallards. Primarily using the tub net launcher, we targeted sites where ducks were being fed by visitors. We made 12 shots at 13 sites capturing 82 birds, with captures ranging from 1 to 17 and averaging 6.8. In addition, bait traps were used on 2 sites and accounted for 27 banded mallards. In total, 108 mallards and 30 previously banded birds were captured. Mallards captured in the Connecticut River watershed and in Berkshire County were swabbed for Avian Influenza testing by APHIS Wildlife Services.

Waterfowl Breeding Surveys

The 2023 Northeast Waterfowl Breeding survey was conducted by all 11 Northeastern states, from Vermont to Virginia. The survey is of randomly selected 12-kilometer plots, primarily by ground. In 2023, 1,232 plots were checked with estimates of 461,644 mallards;21,462 black ducks; 446,531 wood ducks; and 947,548 Canada geese.

Common Eider Population Trends

No attempt was made to band eiders this year.

Permitting

Massachusetts issues individual egg-addling permits for resident Canada goose control under a federal program begun in March 2007. In 2023, we issued 68 such permits. The permittees reported addling 1,596 eggs in 320 nests, while USDA/APHIS Wildlife Services addled 418 eggs in 89 nests under their statewide permit.

Atlantic Flyway Council

This year the summer meeting of the Atlantic Flyway Council technical and council meetings was held in Burlington, Vermont, after 2 years of virtual meetings due to COVID-19 restrictions. In addition, the various committees of the Technical Section held virtual meetings in advance of the official meeting because of the limited time available at the actual meetings. The winter meeting of the Technical Section was held in Jekyll Island, Georgia, February 26—March 2. The project leader is a member of the Mallard, Black Duck, and Canada goose committees as well as voting representative for Massachusetts.

Black Bear Program

Black Bear Distribution and Harvest Investigations

A total of 13,054 bear-hunting permits were issued for the 2022 hunting season. This represents a significant decrease from the record 16,387 permits sold in 2021 and likely reflects the increase in price of a bear permit from $5 to $10. In 2022, 223 bears were taken during the 48-day season, including 155 during the 17-day September segment, 35 during the 18-day November segment, and 33 during the 12-day deer shotgun season segment (Figure W 1 and Figure W 2).

Figure W 1: Historical black bear harvest by season, 1972 to 2022.

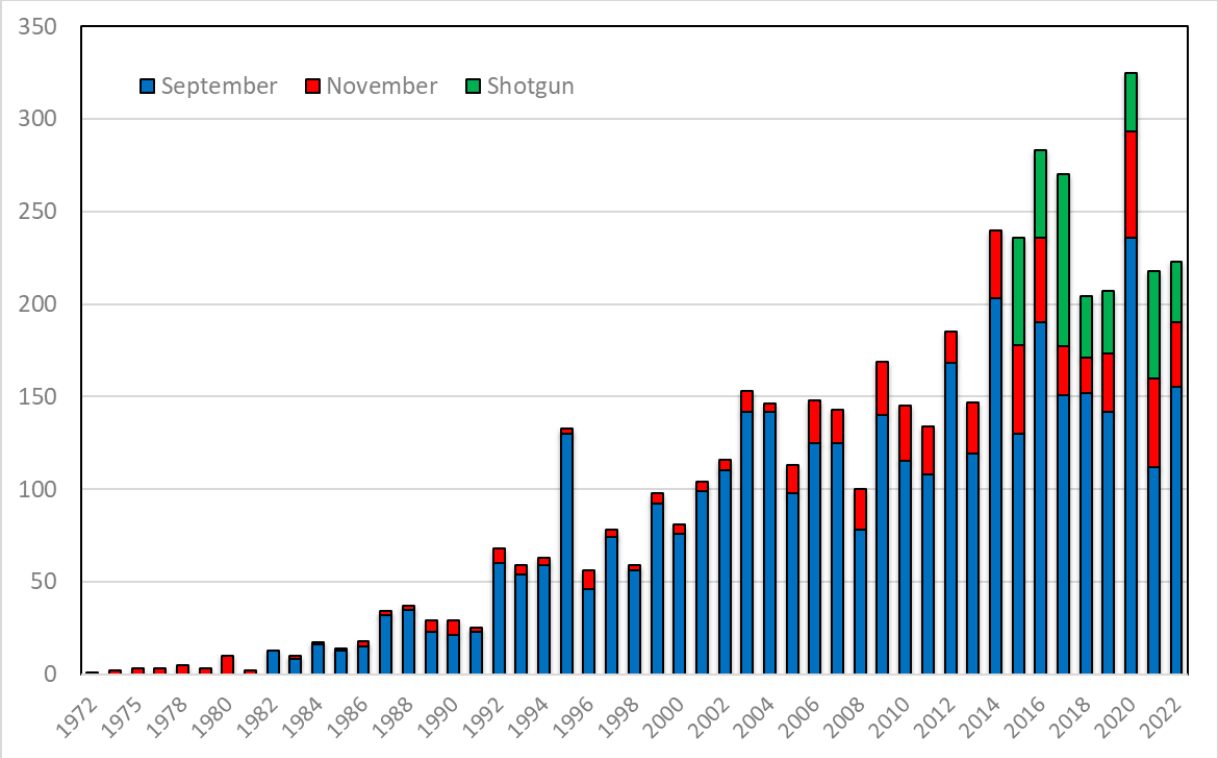
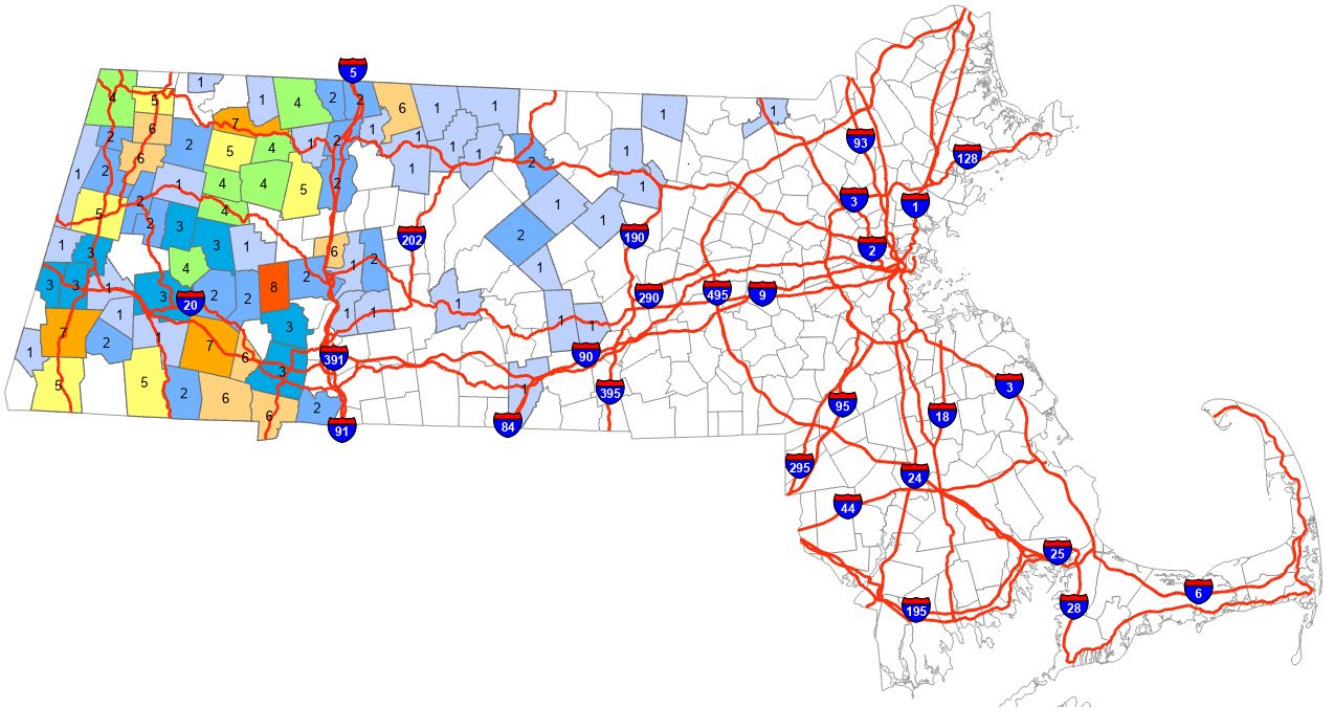


Figure W 2: Distribution of 2022 black bear harvest by town.



One hundred and eighteen males, 100 females, and 5 unknown bears were taken in Berkshire (n=79), Franklin (n=51), Hampden (n=34), Hampshire (n=43), Worcester (n=14), and Middlesex (n=2) counties. Eighty seven percent of bears were reported through the online system in 2022, compared to 92% in 2021, 97% in 2020, 79% in 2019, 82% in 2018, 70% in 2017, 76% in 2016, 66% in 2015, 74% in 2014, and 69% in 2013; the large increase in 2020 and 2021 is likely attributable to the closure of many check stations due to COVID-19 restrictions.

Black Bear Research

MassWildlife continues to monitor collared female black bears as part of a cooperative research project with the Massachusetts Cooperative Fish and Wildlife Research Unit and the University of Massachusetts Amherst. The primary objectives of this research project are as follows: (1) to determine adult female survival and reproductive rates and causes of mortality and refine the population model for evaluating population trends of bears in Massachusetts; (2) to document black bear habitat use and movements in a fragmented landscape and to determine the effects of human-associated food sources on bears, (3) to assess the public's attitudes and perceptions of the bear population and bear management options, (4) to develop a comprehensive bear management plan to guide black bear management in Massachusetts. As of June 30, 2023, 20 female bears were being monitored with GPS collars and another 22 females with VHF collars. To date, 88 female bears have been monitored with GPS collars, of which most have been monitored for at least 2 reproductive seasons. Eight females are being monitored with GPS collars for the first time this year. Additionally, 4 male bears have been monitored with GPS collars. In 2017, we began collaring bears in our Western Wildlife Management District. From July 2022 to June 30, 2023, 5 collared females were killed, 2 in the hunting season, 1 illegal kill, 1 vehicle collision, and 1 unknown. MassWildlife monitored cub production/yearling survival at all successful winter dens or through encounters with sows/yearlings. In the winter of 2022-23 MassWildlife successfully captured 25 females during den checks, including 3 females with yearling cubs, 1 female with no cubs, and 21 females with newborn cubs. Females average 2.25 newborn cubs (1 cub, n=4, 2 cubs, n=11, 3 cubs, n=8, 4 cubs, n=1). Sows with yearlings, where staff was able to confirm the number of yearlings, successfully raised 9 of 12 cubs from the previous winter.

Furbearer Program

Overview

The Furbearer Program is responsible for the management and research of 14 species of wildlife in the Commonwealth. The group of species called furbearers includes beaver, muskrat, bobcat, eastern coyote, red and gray fox, river otter, fisher, striped skunk, mink, long-tailed and short-tailed weasel, raccoon, and opossum.

Massachusetts' furbearers are abundant and widely distributed throughout the state. The populations of these species are scientifically managed and are secure. None are listed as Threatened or Endangered. The value of the Commonwealth's furbearer resource is very diverse and includes economic, ecological, cultural, biological, aesthetic, and educational opportunities for individuals in the state.

The Furbearer Management Program presents many challenges to wildlife managers in the state and employs various options, including habitat manipulation, public education, and regulated hunting and trapping as tools in the management of these renewable resources. A combination of techniques is used to control problem animals, regulate wildlife populations, reduce habitat degradation, reduce crop and property damage, and allow a sustainable harvest of renewable furbearer resources.

Harvest and Population

Harvest activities provide recreational and economic opportunities for citizens and households in the state. A total of 1,727 furbearers were tagged at MassWildlife check stations during the 2022-23 season. The harvest (a combination of hunted, trapped, and/or salvaged) of tagged species included 657 beaver, 153 bobcat, 724 coyote, 90 fisher, 27 gray fox, 5 mink, 21 river otter, and 57 red fox. Trapper survey results indicated that a minimum of 120 raccoons, 58 muskrat, 24 skunks, 28 opossum,

and 1 weasel were trapped during the 2022-23 season (Appendix B, Table B 8).

MassWildlife staff conducted a hunter survey of a random sample of license buyers that provided an email address in 2022. Coyote is the most popular furbearer that is hunted. Nineteen percent of respondents indicated that they hunted coyote, and 37.1% of those respondents specifically targeted coyotes, 4.0% percent of all respondents hunted fox, 4.1% hunted bobcat, 2.2% hunted raccoon, and 0.8% hunted opossum.

Regulated trapping is an important component of wildlife management programs. It is the most feasible and effective method to control furbearer population growth. Regulated trapping conducted by a trained and licensed public is used by state wildlife professionals to regulate wildlife populations and can reduce negative effects associated with high wildlife populations and allow for a sustainable use of a valuable natural resource. Regulated trapping allows residents of the state to reduce the expenses associated with the property damage furbearers cause, which can also in turn reduce the need for residents to pay Problem Animal Control (PAC) Agents.

MassWildlife carefully regulates the harvest of furbearing animals. The Commonwealth has complex laws and regulations that govern the activity of trapping. These include mandatory licensing of trappers and trapper training, restrictions on the size of traps and on types of traps, restricted seasons for trapping and areas for trapping, and mandatory regular checking of traps and tagging of traps to identify the owner.

Wetland/Beaver Management

Between 1996 and 2000, the beaver population tripled because of a ban on certain types of traps enacted through a referendum in 1996. Complaints about flooding increased. Typical complaints included flooded septic systems, wells, roads, driveways, and railroad tracks. In July 2000, the Massachusetts Legislature passed, and the Governor signed, a new law that modified the restrictions on beaver and muskrat traps to provide relief for people suffering from flooding impacts caused by beaver or muskrat. An emergency permitting system was created at the town level with certain non-emergency permits for specific traps available from MassWildlife.

Licensed trappers tagged 650 trapped beaver during the 2022-23 trapping season, of which 46 were reported as taken under emergency permits. PAC Agents reported taking 107 beaver outside the trapping season (April 15, 2021 - October 31, 2021) and 35 beaver during the trapping season under emergency permit that were not tagged. Licensed trappers reported through the voluntary trapper survey that 285 beaver were taken under the local Board of Health 10-day Emergency Permit, which includes beaver taken outside the season (n=285) and only beaver taken during the season that were not sealed at a MassWildlife check station (n=0). The 2022-23 trapper survey did not ask trappers who were not PAC agents or recreational trappers, but only purchased a trapping license to trap nuisance beaver (an overlooked group of trappers), questions on beaver emergency permit trapping. At least 14 individuals who selected 'Other' as their reason for purchasing a license commented that it was specifically to trap nuisance beaver. As a result, we know the number of beavers taken under emergency permit on the trapper survey underestimates the total number taken. In total, a minimum of 392 beaver were taken outside of the trapping season as nuisance animals (there is an unknown amount of overlap between the PAC and trapper survey respondents). A minimum of 472 beaver were taken under emergency permits (either inside or outside the trapping season) for which conibear traps are legal to use and are the preferred trap type for beaver trapping.

Public education, regulated harvest, and the installation of flow devices are major components of beaver management in Massachusetts. MassWildlife management goals for beaver include managing beaver for their wetland values, regulating beaver populations within available habitat, and minimizing economic damage to public and private property by beaver.

Furbearer Depredation and Damage

MassWildlife personnel responded to complaints about furbearer species causing the loss of domestic livestock and pets. Specific furbearer species causing concern are eastern coyotes, red foxes, gray foxes, fishers, raccoons, and skunks. (See also the "Human-Wildlife Conflict Trends Project" section, below.)

Deer Management Program

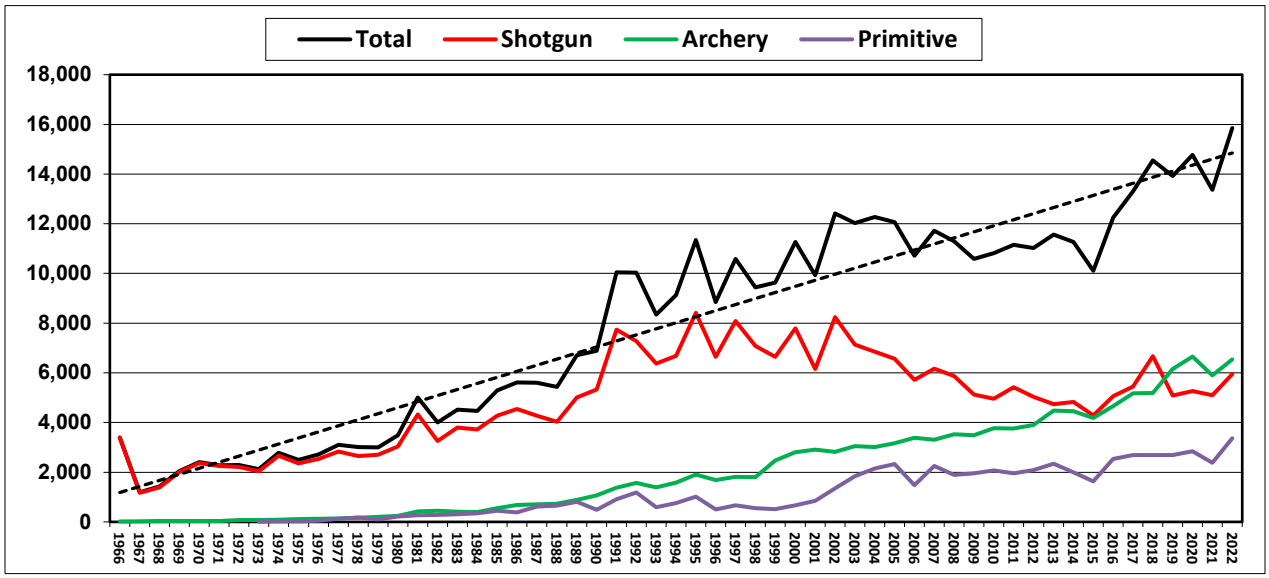
The 2022 statewide white-tailed deer harvest set a new record of 15,853 deer (Table W 1). This was an increase of 18.6% over the 2021 harvest and a 7.4% increase over the record 2020 harvest of 14,757 deer. It was a year of records throughout the state with a new record statewide primitive season harvest, statewide antlered harvest, statewide antlerless harvest, and new Wildlife Management Zone (WMZ) records in zones 4N, 5, 9, 11, and 14).

The recent high harvests can mostly be attributed to rising deer abundance and the influence of increased archery and primitive harvests, particularly in eastern zones. Antlerless deer permit (ADP) allocations were updated in 2022. WMZs 10, 11, 13, and 14 had their limits removed, allowing hunters to purchase additional permits throughout the season with no season bag limit. This wasn't a real change for WMZs 13 and 14, where there has been an artificially high limit in place historically that has not been met since 1988. The primary goals for WMZs 10 and 11 were to allow hunters to theoretically purchase fewer ADPs, considering the fee increase, by allowing them to purchase additional throughout the season and remove the ability for hunters to game the system by purchasing surplus ADPs and actively choosing to not use them.

Table W 1. The 2022 white-tailed deer harvest by season and sex/age class in Massachusetts, including Quabbin Reservoir harvest.

Season	Adult Male	Female	Male Fawn	Total	% Harvest
Para/Youth	55	57	9	121	0.8%
Archery	4,162	1,984	397	6,543	41.3%
Shotgun	3,256	2,002	565	5,823	36.7%
Primitive	1,603	1,473	290	3,366	21.2%
Statewide	**9,076**	**5,516**	**1,261**	**15,853**	**100.0%**

Figure W 3. Total statewide white-tailed deer harvest by season and year in Massachusetts (1966—2022).

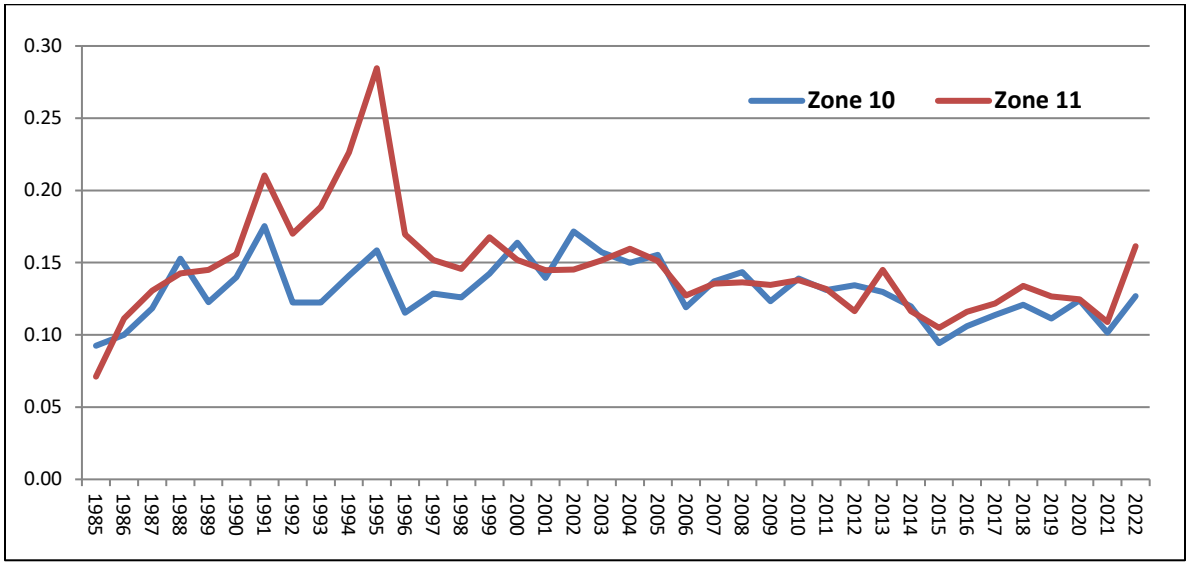


This change to allocation in zones 10 and 11 proved successful by increasing the success rate of antlerless deer harvest in both zones (Figure W 4). It was much more successful in WMZ 11 where there was a new record. The removal of the limit increased permit sales in zone 11 whereas there was a decline in zone 10, as we expected. Zone 10 is near saturation around the Boston suburbs and the limiting factor

has been thought to be access rather than permits; the results of these changes confirmed this.

Currently, the deer population statewide is estimated to be over 160,000 deer. Density estimates are based on harvest-based models, so estimates only apply to lands that are open to hunting and they range from 12-18 deer per square mile of forest in western and central Massachusetts to over 40 deer per square mile on the islands of Martha's Vineyard and Nantucket and in many suburban Boston communities. Areas with little to no hunting access anywhere in the state can see deer abundance well above the model estimates.

Figure W 4. Antlerless Deer Permit (ADP) success rate in zones 10 and 11.



As in previous years, the Antlerless Deer Permit (ADP) system required a hunter to have an antlerless deer permit to harvest an antlerless deer in any deer season. The ADP system regulates female harvest across all Wildlife Management Zones. Overall, we are close to our deer density management range of 12-18 deer per square mile of forest in the western and central parts of the state, with the exceptions of zones 1, 3, and 9 (Figure W 5).

MassWildlife began integrating the purchase rate information into the published allocation in 2022 to increase transparency. This will then be modified on a three-year cycle. The ADP allocation for 2022 was 21,650 permits in zones with limited allocations (Zones 1-9, and 12) and 18,269 were purchased. There were 27,357 permits sold in unlimited zones (10, 11, 13, and 14). Overall, there were 45,626 permits sold in 2022 (Table W 2), which was an increase from the 44,629 sold in 2021.

Figure W 5. Deer abundance by Wildlife Management Zone.

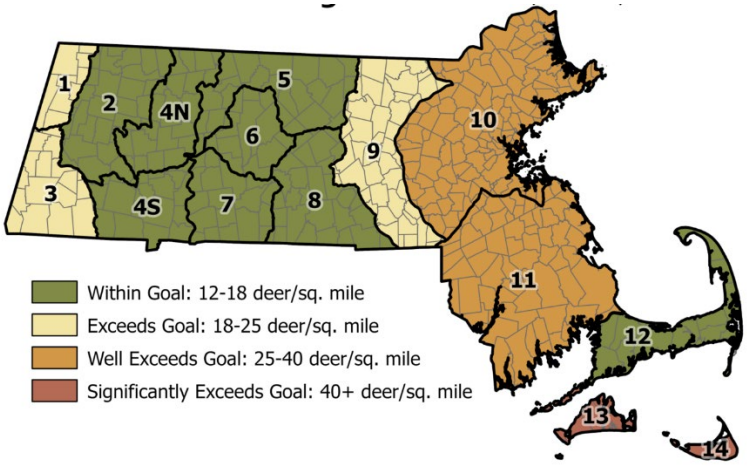


Table W 2. The 2022 (FY 2023) white-tailed deer harvest by deer sex/age and the number of antlerless deer permits allocated and issued, by WMZ, for Massachusetts (Quabbin excluded).

Zone	Adult Male	Female	Buck Fawn	Total	Goal of Allocation	2022 Allocation	2022 Issued
1	266	93	13	372	Reduce	800	671
2	521	74	5	600	Stabilize	400	320
3	446	180	27	653	Reduce	2,050	1819
4N	522	127	9	658	Stabilize	800	675
4S	326	54	5	385	Stabilize	600	473
5	568	218	32	818	Stabilize	1,950	1665
6	213	65	15	293	Stabilize	400	307
7	412	223	38	673	Stabilize	3,000	2114
8	666	206	42	914	Increase	3,100	2569
9	787	557	130	1,474	Stabilize	7,200	6538
10	1,386	1,144	263	2,793	Reduce	Unlimited	11,089
11	2,155	1,662	442	4,259	Reduce	Unlimited	13,038
12	207	87	14	308	Stabilize	1,350	1,118
13	309	393	127	829	Reduce	Unlimited	1,647
14	292	433	99	824	Reduce	Unlimited	1,583
Statewide	9,076	5,516	1,261	15,853		21,650	45,626

** Antlerless deer permits are functionally unlimited in Zones 10, 11, 13, and 14*

Hunters Share the Harvest

MassWildlife launched an agency-led venison donation program branded as MassWildlife's Hunters Share the Harvest in 2022. This was done in collaboration with the Massachusetts Department of Public Health to address food insecurity across the Commonwealth while creating an outlet for hunters that would like to harvest more deer. All logistics and inspections are being conducted by MassWildlife staff. In 2022, MassWildlife conducted a soft launch beginning during the shotgun season with only one processor. All venison was ground and distributed through the Massachusetts Military Support Foundation's Food4Vets program. The pilot year total was approximately 1,800 meals of venison. MassWildlife is rapidly expanding the program for 2023 with at least three processors participating and several new food distribution organizations.

As part of this new focus on addressing food insecurity, MassWildlife added adapted questions from the U.S. Census Bureau's Household Survey to gauge food insecurity risk amongst Massachusetts hunters and to measure the importance of game to feeding the Commonwealth.

- 26% of successful resident deer hunters gave away or donated venison to other families in 2022.
- More than 40,000 pounds of processed venison were given to other families.
- 11.4% of licensed hunter households would be considered food insecure.
- Harvested game was essential for 18.3% of hunters to supplement limited available food resources.
- More than 1.8 million household meals came from harvested game in Massachusetts.

Research

MassWildlife continued to collaborate with USDA Wildlife Services for SARS-CoV-2 surveillance in 2022. In 2021, the antibody prevalence rate was 15.4%, which was lower than the national rate of 31.6%. We have not received the final results for 2022, but of the 236 samples tested so far out of 751 submitted in 2022, 0 have tested positive. MassWildlife was notified in February 2023 that USDA had detected 3 cases of deer to human transmission as part of the SARS surveillance in 2021. Massachusetts had 1 of the 3 cases. MassWildlife collaborated with the Massachusetts

Department of Public Health to conduct an interview with the individual identified and could not find any connecting cause to an intermediary hunter, staff member, or behavior.

In collaboration with the Massachusetts Cooperative Fish and Wildlife Research Unit, MassWildlife conducted a survey in December 2022 and January 2023 of license holders, captive cervid operators, MassWildlife staff, Massachusetts Environmental Police officers, and board members to measure knowledge, risk perception, behavior, and media consumption around Chronic Wasting Disease. The survey did find that 40% of license holders have hunted for CWD susceptible cervids outside of Massachusetts in the last 5 years and 29% in states/provinces with CWD already detected (not including Florida or Oklahoma, where first detections occurred after the survey was conducted).

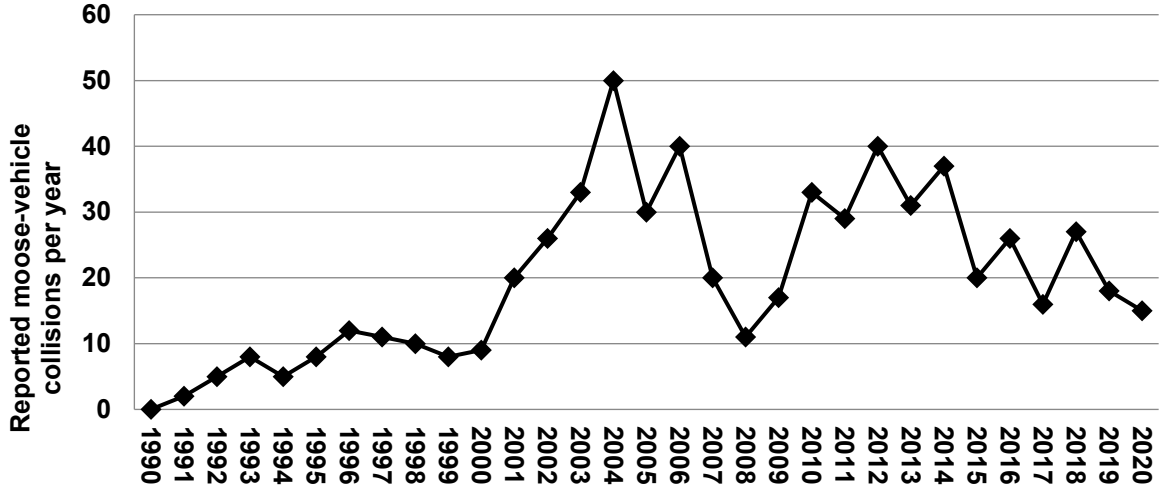
MassWildlife is assisting with a multistate NSF project focusing on managing suburban wilds. The project includes faculty, graduate students, and postdocs at Boston University, University of Wisconsin Madison, Texas A&M University, and Colorado State University.

MassWildlife has joined the CDC funded, New England Regional Center of Vector-Borne Diseases (NEWVEC) based at UMass Amherst to help develop deer-focused strategies for tick abundance and tick-borne illness. This has included collaboration on several research projects, including the publication of Pearson et al. (2023; *White-tailed deer serum kills the Lyme disease spirochete, Borrelia burgdoferi*). MassWildlife and the NEWVEC are developing a captive research facility at UMass Amherst to allow for rapid development of new acaricides and treatments for reducing tick abundance.

Moose Program

Traditionally, MassWildlife has collected reported data of moose-vehicle accidents (MVA). In 2022, 22 MVAs were reported. However, MVAs are not always reported to MassWildlife or to the Massachusetts Environmental Police; thus, these reports make up an unknown fraction of the actual human-moose interactions that occur in the state. For example, many are discovered indirectly through newspaper reports or verbally from staff that drove by a dead moose along the road. Further, caution must be used when looking at the number of collisions reported from year to year because reporting rates can vary from year to year depending on many factors, e.g., in Figure W 6, the reporting rate was likely low in 2007-2009. Nonetheless, these indices can be useful for biologists to use, along with other population trends, to monitor moose relative abundance and trends in Massachusetts.

Figure W 6. Total moose-vehicle accidents reported per year from 1980 to 2020 in Massachusetts.



The number of reports per town can be useful when making decisions about areas to focus on with signage on highways (Figure W 6). Starting in 2015, we worked with MassDOT to have large variable-message boards placed along the road in many of the moose-vehicle collision hotspots during the months of September and October, when moose activity spikes related to breeding. This action may have reduced the number of collisions independent of moose population trends.

The current moose population in Massachusetts is estimated to be around 1,000 animals. We have used a basic population model that incorporates standardized sighting rates from an annual deer hunter survey (we ask a random sample of deer hunters how many moose sightings they had per hour of deer hunting) and available moose habitat in the 12 WMZs that we feel have the potential for moose (we exclude Cape Cod and the Islands in our estimate as they do not represent potential moose habitat).

The Human-Wildlife Conflict Trends Project

Overview

Animal report data are collected at MassWildlife offices via the Massachusetts Division of Fisheries and Wildlife Animal Report Form. The data collected include date, species, town, and report type (sick or injured animal, aggressive animal, property damage, depredation, etc.). Reports come in the form of phone calls and emails from the general public. Reports are recorded as given by the individual and therefore are not considered accurate with regard to species identification or the circumstances of the incident. In other words, the data collected are meant to represent the public's perception of a conflict or interaction with wildlife.

In 2015, a new online data collection system was developed to emphasize the importance of rigorous data collection. This data collection system allows staff to better categorize reports by providing the collector with a set of standard report types from which to choose. Staff are also able to collect data on the type of concern associated with the report. This system has made data collection and data entry more efficient by requiring the collector to subjectively interpret and categorize the report type. Additionally, the importance of collecting data for all reports regardless of species, location, report, or concern has been emphasized.

Summaries include, but are not limited to, graphs displaying differences in volume of report type, concern type, species, and season. Maps are developed using MassGIS to geographically display the distribution of reports by type and species. These summaries are meant to provide Field Headquarters and District biologists with information to assist when providing advice and management options to the general public regarding human-wildlife interactions and conflicts.

The purpose of this study is to produce information that can be used to develop proactive management strategies effective at resolving human-wildlife interactions and, more specifically, human-wildlife conflicts. This is accomplished by analyzing wildlife report data, generated through unsolicited phone calls and emails from the public received at each of the six MassWildlife offices regarding a variety of wildlife-related issues.

Summaries

Human-wildlife interactions were recorded in 293 of 351 towns across Massachusetts, amounting to 1,527 total reports submitted from July 1, 2022, through June 30, 2023 (Figure W 7). Ninety-nine percent of records (1,505) contained one or more species (11 reports contained more than one species recorded), 100% (1,527) contained a report type, 89% (1,365) contained a concern type other than "no concern," and 94% (1,439) contained a town.

MassWildlife staff received reports of 55 different species, of which 12 made up 78% of all reports (Figure W 8). More reports were received in July (271, 18%) than any other month, followed by June (192, 13%), May (191, 13%), and August (186, 12%; Figure W 9). Of the 1,527 reports containing a report type, the highest number of reports were animal sightings and/or requests for general information (1,170, 77%), the second highest number of reports were of wildlife using and/or damaging property (834, 55%), and the least number of reports were those regarding public safety (81, 5%). Reports regarding threats to public safety included: wildlife approaching humans and/or pets on a leash, aggression toward humans, and human attacks. Of the 81 reports of threats to public safety, eight were reported as a human attack involving a beaver (1), raptor (2), fisher (1), fox (1), and wild turkey (3). It is

important to note that these data represent the reporters' perception of an "attack" and that physical contact and resulting injuries sustained by people may not have been confirmed or documented by MassWildlife staff. The record of the beaver attack on a person was confirmed by local law enforcement at the time of the incident and the animal tested positive for rabies.

Figure W 7. Total reports of human-wildlife interactions per square kilometer for FY 2023.

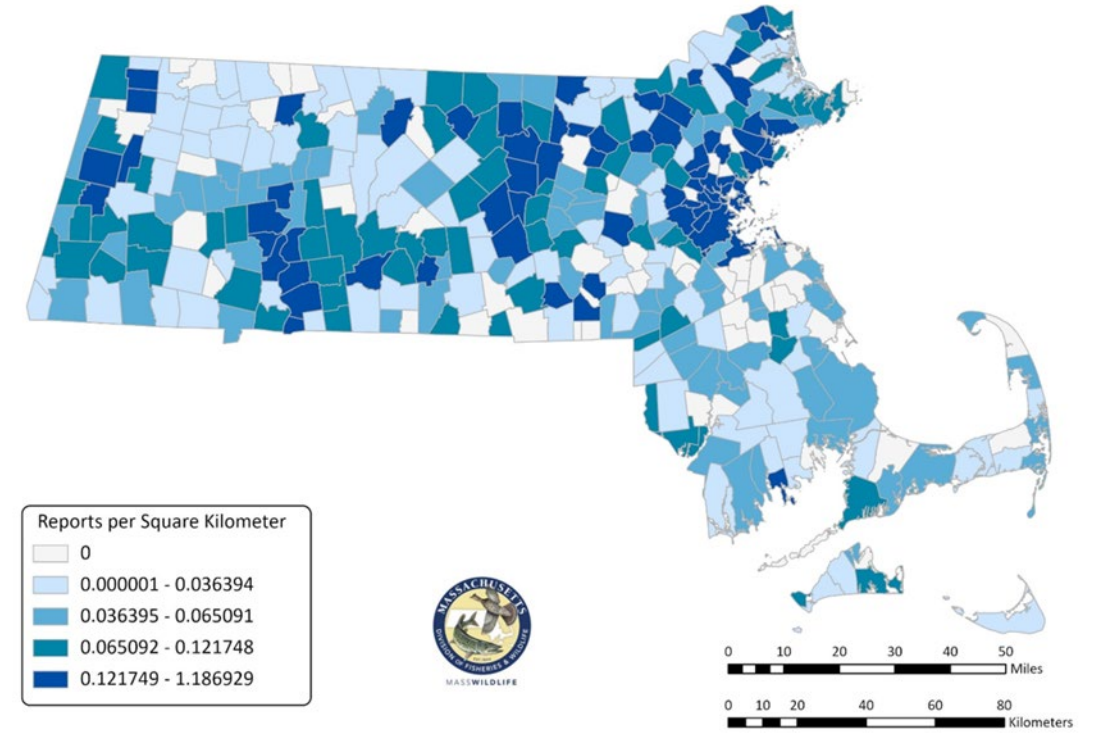


Figure W 8. Top 12 species that were reported to MassWildlife offices as being involved in human-wildlife interactions in Massachusetts in FY 2023.

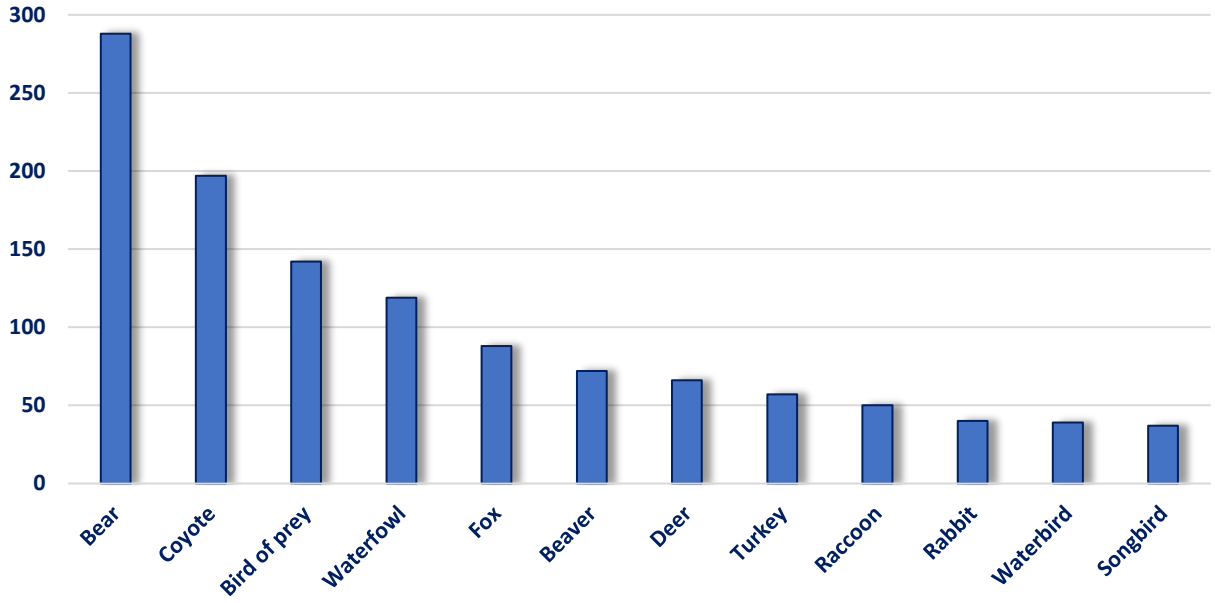
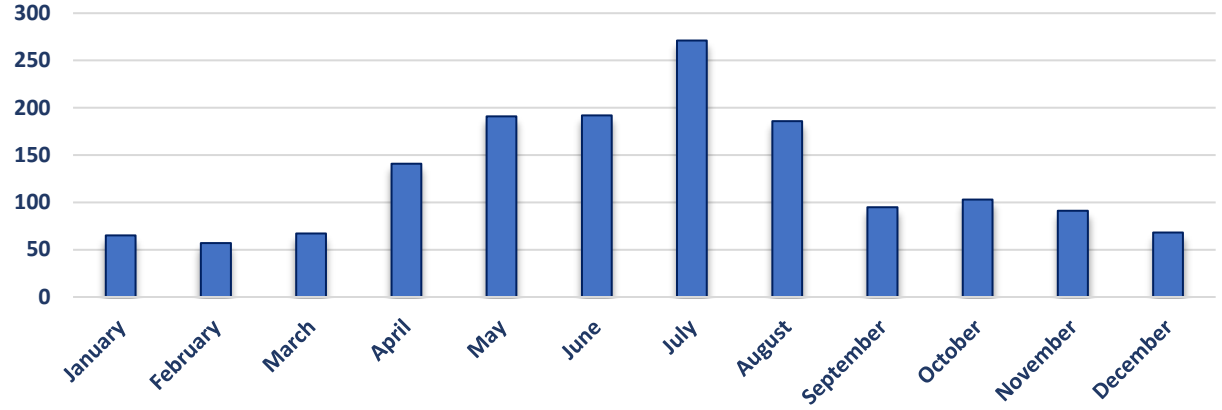


Figure W 9. Total reports of human-wildlife interactions by month in Massachusetts, July 1, 2022—June 30, 2023.



Conclusion

Summarizing reports of interactions gives the agency the power to better inform both the public and MassWildlife biologists. Summary information can also be used to detect trends in interactions both spatially and temporally. Total report density across towns has remained relatively consistent over time. In general, major metropolitan areas (Pittsfield, Springfield, Worcester, Fitchburg, and Boston) tend to report more interactions between humans and wildlife than do more rural settings.

MassWildlife can, at the very least, use these data and these results to attempt to predict the occurrence of human-wildlife interactions on both a temporal and spatial scale. Beyond that, staff can advise the use of proactive education and intervention at specific times of year and in key areas of the state where a high volume of human-wildlife interactions are likely to occur. Specifically, biologists will utilize summaries of past years' data to inform Outreach and Education (O&E) staff on the type(s) of interactions the public should expect. O&E staff can then proactively provide information to the public on the species they can expect to interact with at specific times of year in certain areas of the state. Staff can further proactively educate the public on animal behavior (breeding seasons, feeding preferences, activity cycles, etc.) based on the ability to predict timing of influxes of specific human-wildlife interactions reports. It is likely that many of the negative interactions between humans and wildlife reported to the agency are accurate portrayals. That said, it is equally as likely that many of those interactions can be prevented through educating the public on what to expect and how to prevent the interaction (e.g., blocking off denning sites, eliminating food sources, and securing pets). Figure W 10 and Figure W 11 depict the total number of reports received each fiscal year since FY 2011 and the total number of reports received, by MassWildlife field office, for the past six fiscal years, respectively.

Figure W 10. Total reports of human-wildlife interactions, FY 2011 to FY 2023.

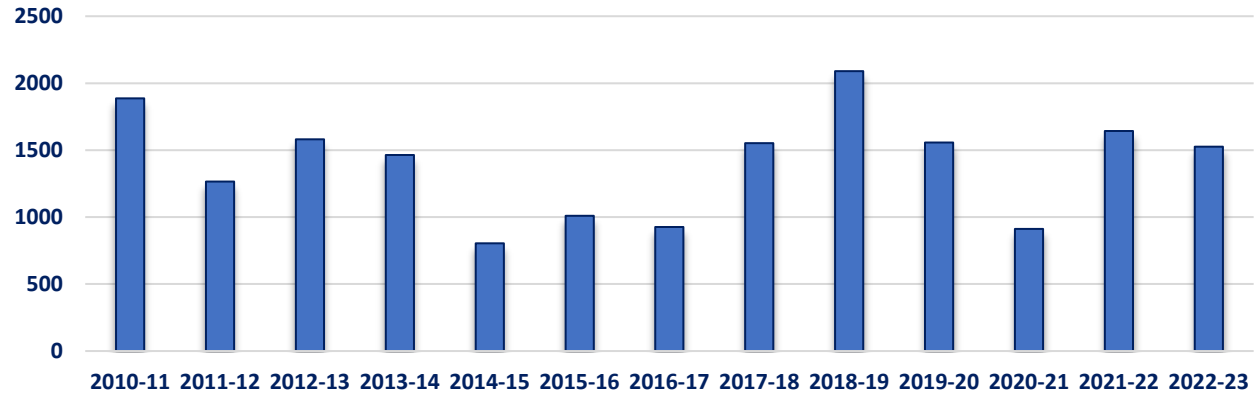
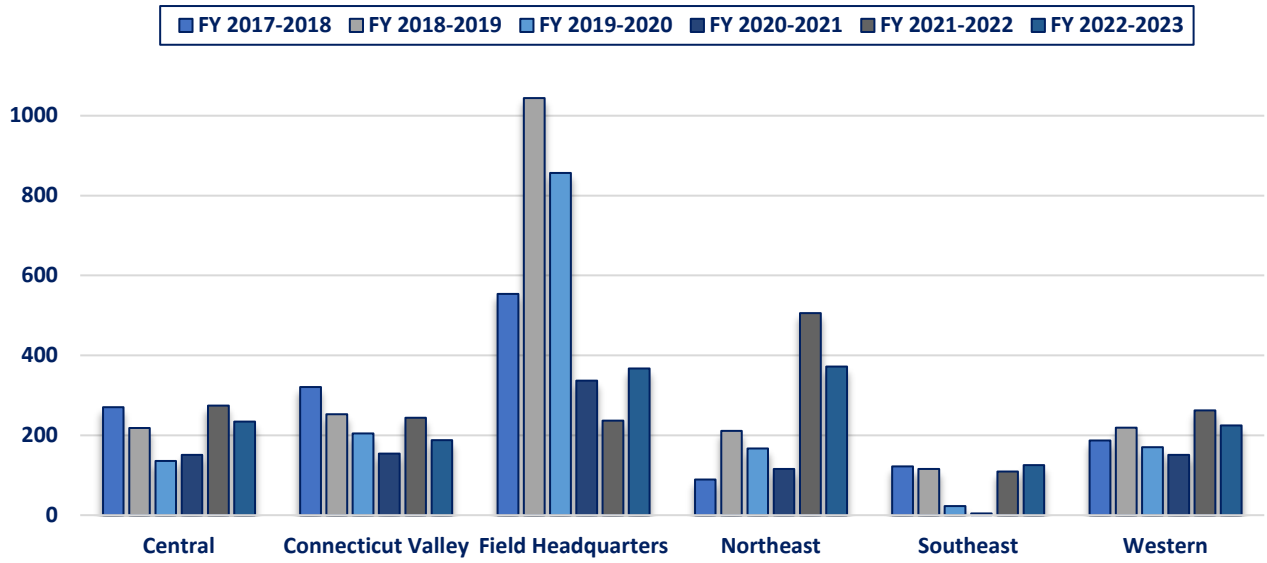


Figure W 11. Total reports of human-wildlife interactions by District, FY 2018 to FY 2023.



Ornithology

Kestrel Research and Management

To promote breeding productivity of American Kestrels, MassWildlife and partners deployed and maintained kestrel nest boxes in suitable habitat and recorded occupancy and nesting success rates. In the Connecticut River Valley, the Kestrel Land Trust (KLT) monitors numerous nest boxes. Of the boxes they maintain and monitor, 8/24 (33%) were occupied by nesting kestrels. Of these, 7 pairs (88% of occupied boxes) successfully fledged kestrel chicks, and 30 chicks survived and were banded prior to fledging. In addition, there were three successful kestrel boxes at the Arcadia Wildlife Sanctuary (Mass Audubon) and several others on private property, and 16 chicks were banded at those boxes prior to fledging. In central Massachusetts at least 17 nest boxes were used for nesting with a minimum of 12 producing fledglings. These boxes were managed by MassWildlife, East Quabbin Land Trust, DCR, The Trustees, Grafton Land Trust, and private landowners. In southeastern Massachusetts, Keeping Company with Kestrels reported 7 occupied kestrel boxes at cranberry bogs in the Carver area. Additionally, several nesting pairs were documented on Cape Cod including at the Frances Crane Wildlife Management Area. There are numerous other kestrels that nest in areas of Massachusetts that we do not regularly monitor, including birds that nest around airfields, in urban landscapes, and on private farms.

In addition to documenting nesting productivity by monitoring boxes and banding young, MassWildlife deployed radio-transmitters on 21 adult kestrels (16 females, 5 males) to document movement and survival patterns throughout the annual cycle. These radio-transmitters, manufactured by Cellular Tracking Technologies, are designed to communicate with Motus tracking stations that are deployed throughout North America to automatically detected animals when flying within approximately 15 kilometers from a station. Six of these kestrels were nesters in cranberry bogs in southeastern Massachusetts (tagging done in partnership with Keeping Company with Kestrels), 14 were nesters in central and western Massachusetts, and one nested in greater Boston. We expect to get detections of many of these birds during fall migration as they depart their nesting areas in Massachusetts and move south to their wintering grounds. During autumn 2022, we obtained detections on all 14 kestrels tagged that summer during their fall migration, and six birds were again detected during spring migration as they returned to Massachusetts.

Motus Receiving Station Network Project

The Massachusetts Division of Fisheries and Wildlife is a partner agency on a Competitive State Wildlife Grant to deploy and maintain a network of inland Motus receiving stations throughout New England. New Hampshire is the lead state on the project with

the New Hampshire Audubon Society being the lead organization coordinating work throughout New England. The goal of the project is to establish 50 strategically located inland automated telemetry receiver stations in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. This project will close a major geographic gap in receiving stations within the Motus Wildlife Tracking System (www.motus.org).

After reviewing numerous possible locations for Motus stations, the team selected sites based on geography, access, and permissions to deploy a station. In total, 10 sites were selected to host a Motus receiving station in Massachusetts. Three stations were deployed in FY 2022 and six in FY 2023. The final station is slated for deployment in late 2023. Each station includes a receiver (SensorStation, Cellular Tracking Technologies), power supply, and a small tower with up to eight directional antennas pointed in different directions to detect the two types of radio frequencies used for small animals (e.g., birds, bats, insects). When a transmitter is detected, data are automatically updated to the internet over the cellular network where biologists and the public can view results. All data are made available to project leaders and those managing a given station. All stations have detected tagged animals including kestrels, warblers, thrushes, swallows, blackbirds, sparrows, shorebirds, and monarch butterflies. These stations have been incorporated into the Motus Tracking Network and are available for use by any biologist (e.g., agency, academic, nonprofit biologists) by deploying the appropriate radio-transmitters on animals and registering transmitters in the Motus system.

* Other ornithology projects can be found within the Natural Heritage and Endangered Species Program report.

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4 The Natural Heritage and Endangered Species Program

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Overview

MassWildlife's Natural Heritage and Endangered Species Program (NHESP) conserves and protects the most vulnerable native animal and plant species of Massachusetts and the habitats upon which they depend.

NHESP staff members are distributed primarily among three sections: Conservation Science, Information Management, and Regulatory Review. Conservation Science staff are responsible for determining the abundance and distribution of rare species in Massachusetts through field inventories and biological research and the planning and implementation of conservation efforts for rare species and their habitats. The Information Management Staff are responsible for the development and management of biological data in the NHESP's expansive tabular and spatial databases. The Regulatory Review staff assesses the potential impacts of proposed projects or activities to federally- and state-listed species and their habitats and provides guidance on avoidance, minimization, and mitigation measures.

The NHESP's highest priority is protecting the native species that are listed as Endangered, Threatened, or of Special Concern in Massachusetts pursuant to the Massachusetts Endangered Species Act (MESA; M.G.L. Ch. 131A) and its implementing regulations (321 CMR 10.00).

Changes to the Massachusetts List of Endangered, Threatened, and Special Concern Species

The MESA (M.G.L. Ch. 131A) and its implementing regulations (321 CMR 10.00) require review and updating of the List of Endangered, Threatened, and Special Concern Species ("the MESA list," 321 CMR 10.90) at least once every 5 years. In recent years, the MESA list has been updated approximately every 4 years. There are three main categories of change: (1) listing (addition of a species to the list); (2) delisting (removal of a species from the list); and (3) change in listing status of a species (Special Concern ↔ Threatened ↔ Endangered). Changes are proposed on a species-by-species basis. The last update of the MESA list was promulgated on January 10, 2020. The process for updating the MESA list involves many steps, and typically takes about a year to complete. The list change process and associated information are detailed in the document titled "Listing Endangered Species in Massachusetts: The Basis, Criteria, and Procedure for Listing Endangered, Threatened, and Special Concern Species," available at: https://www.mass.gov/files/documents/2016/08/qd/listing-criteria.pdf.

The process for changes to the MESA list anticipated to occur in 2024 began in September 2022. Between September 2022 and January 2023, NHESP biologists consulted with experts, collated, and analyzed data to inform potential list changes, and decided which list changes would be proposed. In January and February 2023, NHESP biologists wrote a total of 16 list change proposals (4 invertebrate animals and 12 plants). In addition, a proposal to delist the humpback whale (*Megaptera novaeangliae*) was received from the Massachusetts Division of Marine Fisheries (DMF), and proposals were received from members of the public to list three species of bats, the American horseshoe crab (*Limulus polyphemus*), and 6 plant species. In total, 27 list change proposals were submitted for consideration: 23 listing proposals, 2 delisting proposals, and 2 proposals for a change in listing status.

The 27 list change proposals were reviewed and commented on by external experts (at least three reviewers for each proposal) from April through June 2023. Staff biologists reviewed all comments from external reviewers and revised list change proposals

as needed. In June 2023, NHESP staff met to discuss all proposals and finalize NHESP recommendations. On June 21, 2023, all list change proposals were presented and discussed at a meeting of MassWildlife Senior Staff. It was decided that the NHESP supported 25 of the list changes as proposed. Regarding the American horseshoe crab, the NHESP did not recommend listing. Regarding the proposal to delist the humpback whale, the NHESP instead recommended down-listing from Endangered to Special Concern. After the close of the fiscal year, DMF decided to withdrawal the listing proposal for the humpback whale.

Staff will present these recommendations to the Natural Heritage and Endangered Species Advisory Committee (NHESAC) at the summer 2023 meeting (July 27, 2023) for review and discussion. NHESAC will make a final recommendation to the Director for presentation to the Fisheries and Wildlife Board for consideration for a public hearing and a subsequent board vote in Spring of 2024. It is anticipated that changes to the MESA list will be promulgated in mid-2024.

BioMap: The Future of Conservation in Massachusetts

The new BioMap (mass.gov/biomap) was launched in November 2023. BioMap is the result of an ongoing collaboration between MassWildlife and the Massachusetts Chapter of The Nature Conservancy. BioMap is a collaborative guides strategic protection and stewardship of lands and waters that are most important for conserving biological diversity in Massachusetts. Numerous MassWildlife staff contributed to BioMap from all sections; updates include new data (including site and climate resiliency data), data analysis and presentation at multiple scales, and an innovative user-friendly interactive web map and ArcGIS hub site. The new BioMap identifies resilient and vulnerable habitats that need greater prioritization for land protection and management and will help to guide efficient prioritization of solutions to mitigate climate change effects (e.g. land protection, habitat management and restoration, infrastructure improvements).

Additionally, in FY 2023, two BioMap Outreach Specialists were hired to assist with the rollout of BioMap. Along with the BioMap development team, these contractors worked on a series of outreach activities to engage and connect with organizations and communities about the updated BioMap. They conducted over 50 virtual and in-person presentations to a total number of over 1000 participants; corresponded directly with users to make them aware of the update and answer any questions about the BioMap tools; and provided technical assistance as requested. New resources such as BioMap Town Reports were also created and shared with users.

Linking Landscapes for Massachusetts Wildlife

In 2008, MassWildlife and the NHESP entered into an interagency service agreement (ISA) with the Massachusetts Department of Transportation (MassDOT), Highway Division, to improve the efficiency of state-level environmental project review. This nationally recognized model of cooperation between state agencies has resulted in faster reviews, cost savings, and protection of endangered species and their habitats. As part of the ISA, both agencies agreed to pursue proactive projects to reduce wildlife-vehicle collisions and improve public safety where feasible. Transportation infrastructure affects wildlife through direct mortality due to vehicle collisions and by fragmenting and degrading habitats. In addition, vehicle collisions with wildlife often result in property damage and sometimes personal injury.

In conjunction with the University of Massachusetts (UMass) Amherst, the agencies launched Linking Landscapes for Massachusetts Wildlife (LLMW), a long-term and multifaceted volunteer-based monitoring program and planning collaboration to be implemented throughout the state. Utilizing expertise from various state departments, along with collaboration with the public, LLMW's objectives are to 1) reduce wildlife-vehicle collisions and improve public safety; 2) enhance, protect, and restore habitats impacted by roads; 3) control invasive species along road rights-of-ways; 4) incorporate conservation priorities into transportation planning; and 5) implement wildlife and transportation related research.

In 2010, four research projects were developed to collect information through volunteer participation designed to gather information on wildlife mortality along roadways. Three separate databases available on the LLMW website serve as a central location for compiling observations of vernal pool amphibians during spring migration, turtle crossing hotspots, and all other species of wildlife. LLMW has also

coordinated a monitoring program for freshwater turtle mortality associated with the nesting season. From 2010 to the end of FY 2022, over 520 volunteers participated in these projects. They documented over 6,450 mortalities (representing 82 species) at 2,301 locations throughout the state, including mortality for nine currently and formerly state-listed salamander and turtle species.

In FY 2023, LLMW installed wildlife barriers to enhance public safety and reduce diamondback terrapin mortalities at a coastal site. LLMW implemented invasive species control and habitat restoration at hotspots for biodiversity and engaged with various community organizations.

To support ongoing conservation and transportation planning and prioritization, LLMW funds were used to refurbish GPS iridium collars used to study the interaction of black bears with the road and highway network of the Commonwealth. Data from these collars is being used to evaluate black bear movements in the state and how they are influenced by the road network and what features of the roadways and the landscape influence where and when bears crossroads. Finally, in order to study the elusive nocturnal whip-poor-will, LLMW facilitated the purchase of transmitters for use in automated radio tracking. This work presents an opportunity to collect unprecedented movement and habitat use data on whip-poor-wills during the nesting period. Specifically, these efforts will enable MassWildlife to document breeding season movements, habitat use and selection, territory size and habitat composition, and diurnal roosting and nesting locations. This data contributes to a professional conservation network for undergraduate and graduate students and professional colleagues.

Birds

Piping Plover; Federally Threatened

Observers reported breeding pairs of piping plovers (*Charadrius melodus*) present at 209 sites; 150 additional sites were surveyed at least once, but no breeding pairs were detected. The population increased 6.8% relative to 2021. The Index Count (statewide census conducted 1-9 June) was 1,013 pairs, and the Adjusted Total Count (estimated total number of breeding pairs statewide for the entire 2022 breeding season) was 1,033 pairs. A total of 1,330 chicks were reported fledged for an overall productivity of 1.31 fledglings per pair, based on data from 98.6% of pairs.

American Oystercatcher (Haematopus palliates)

MassWildlife coordinated annual monitoring and protection efforts for American oystercatchers (*Haematopus palliates*) conducted by a coastwide network of cooperators. Approximately 201 sites were surveyed during May and early June 2022. Preliminary results indicate that Massachusetts supported an estimated 212 breeding pairs of oystercatchers in 2022.

Terns, Laughing Gulls, and Black Skimmers

Cooperators in Massachusetts surveyed 298 coastal sites in 2022 for the presence of breeding roseate terns (*Sterna dougallii*), common terns (*Sterna hirundo*), arctic terns (*Sterna paradisaea*), least terns (*Sternula antillarum*), black skimmers (*Rhynchops niger*), and laughing gulls (*Larus atricilla*). Approximately 100 sites were occupied by nesting birds. All common tern and laughing gull colonies were surveyed in entirety for the first time since 2019 and both species showed substantial increases over that time period, reaching record highs: common terns increased 33% to 27,000 pairs and laughing gulls 42% to 5,200 pairs. Compared to 2021, roseate terns increased 2% to 3,170 pairs (a record high), least terns decreased 23% to 4,131 pairs, arctic terns decreased from 1.5 pairs to 0.5 pairs, and black skimmers increased from 19 pairs to 23 pairs (a record high). Earliest and median first egg dates across sites were May 20/May 20 for roseate terns, May 10/May 31 for common terns, May 21/May 31 for least terns, May 30/July 3 for black skimmers, and May 24/(n/a) for laughing gull. No chronology data were available for arctic tern.

Buzzards Bay Tern Restoration Project

Common terns numbered 2,754 pairs on Bird Island and 3,097 pairs on Ram Island. Roseate terns numbered 2,031 pairs on Bird, a record high, and 934 on Ram. Common tern productivity was 0.84 and 1.12 fledglings per nest at Bird and Ram, respectively. For roseate terns, productivity was lower than average, 0.82 and 0.60, respectively, due largely to predation at both sites. On Penikese Island, common terns increased to a record-high

1,621 pairs. Roseate terns increased to 37 pairs. One individual arctic tern searched for a mate but never nested. For common terns, productivity was 1.46 fledglings per pair, despite significant predation. Roseate tern productivity was 1.36 fledglings per pair.

An estimated 1,026 pairs of herring gulls and 128 pairs of great black-backed gulls nested. Mean clutch size for herring gulls was 2.45 eggs per nest and apparent hatching success was 69.4%. Mean clutch size for great black-backed gulls was 2.8 eggs per nest and apparent hatching success was 82.1%. Nine pairs of great egrets, 34 pairs of snowy egrets, at least 14 pairs of glossy ibis, 278 pairs of double-crested cormorants, 107 pairs of common eiders, six pairs of American oystercatchers, and at least one pair of Leach's storm-petrels nested. No nesting black-crowned night herons were detected.

Common Loon (Gavia immer)

Statewide monitoring of nesting loons was a collaborative effort among staff at MassWildlife, the Mass. Department of Conservation and Recreation (DCR), and Biodiversity Research Institute (BRI). Prior to the nesting season, MassWildlife staff deployed a nesting raft at Cleveland Brook Reservoir (Dalton). Rafts also were deployed at the Quabbin and Wachusett reservoirs (DCR staff), the Pine Hill Reservoir (Worcester watershed staff), and the Assawompset Pond Complex in Lakeville (BRI staff). Surveys were conducted at waterbodies throughout the state suitable for loon nesting to determine if they were being used by loons during the breeding period. Sites were surveyed by a single observer by walking the shoreline and/or by kayak. When a loon was sighted, time was spent watching the bird through binoculars and/or a spotting scope to try and identify the bird by reading any color bands. Once territorial loons were identified, the birds were monitored to locate nests and determine nesting and fledging success.

During the 2022 nesting season, MassWildlife staff and collaborators surveyed 135 waterbodies for nesting loons. In total, 46 territorial pairs of loons were documented on 24 waterbodies. Two pairs were observed in the southeast portion of the state and two pairs were recorded in western Massachusetts (Berkshire County). The remaining 42 pairs (91%) were in the region extending from Concord to Springfield. Of the total number of territorial pairs, 27 (59%) attempted nesting, which is a little lower than average. Number of nesting attempts was particularly low in the Quabbin Reservoir where density-dependent factors are thought to be interrupting loon nesting behavior. For the entire state population, reproductive success was relatively low (0.37 chicks surviving per territorial pair) and below the level thought to support a sustainable population (0.48). Productivity was highest on the Wachusett Reservoir and nearby Haynes Reservoir, where six territorial pairs produced 8 fledged chicks for a 1.33 successful chicks per territorial pair. Throughout the state, chick survival was relatively high, with 74% (17/23) of those hatching surviving to fledging.

Much of the loon population in the state nests on the Quabbin Reservoir (18 territorial pairs) and the Wachusett Reservoir (5 territorial pairs), and these birds are monitored by DCR staff. Nests were documented for 12 of the 18 pairs on the Quabbin, and these nests produced 6 hatchlings, with 3 surviving to fledging. Nesting productivity was much higher on the Wachusett Reservoir, with 5 territorial pairs producing 5 nests, 6 hatchlings, and 6 fledglings. Another successful nest was documented by DCR staff at Hycrest Pond. MassWildlife and BRI staff monitored loon pairs on waterbodies not managed by DCR and primarily located on lakes, ponds, and reservoirs in central Massachusetts. Of these, nesting was documented at 10 sites, producing at least 9 hatchlings and 6 fledglings.

As part of the restoration efforts supported by the Bouchard 120 Oil Spill Settlement Fund, BRI partnered with MassWildlife to continue a loon translocation project in Massachusetts. In 2022, BRI translocated a total of 11 Common Loon chicks from Maine to western Massachusetts (Berkshire County). Chicks were translocated at approximately 5-12 weeks of age. Of the 11 translocated chicks, 5 were reared in aquatic enclosures for 15-21 days before being released and 6 older chicks were directly released onto suitable waterbodies.

Bald Eagle (Haliaeetus leucocephalus)

The 2022 Spring nesting eagle survey took place on April 8, when agency staff and volunteers checked known eagle territories and explored areas with potential eagle habitat to verify continued use of "old" eagle nests and try to locate "new" nests. The elevated effort on this day helps with the increasingly difficult effort to monitor the state's growing numbers of breeding bald eagles and

provides much of the information that we gather on the numbers of nesting bald eagles in Massachusetts. In addition to the single day count, information on nesting eagles is gathered opportunistically throughout the year. Any reports of nesting eagles are investigated by MassWildlife staff to document new nesting pairs. When possible, these nests are monitored throughout the breeding season and staff band chicks in the nest.

During the summer of 2022, there were 77 known territorial pairs of bald eagles in Massachusetts. The highest concentrations of nesting eagles were along the Connecticut River (17 territories). However, due to staffing limitations, the Quabbin Reservoir was not surveyed, and this waterbody historically hosts around 10 pairs of nesting eagles. The Merrimack River, Westfield River, and the Assawompset Pond Complex also had multiple pairs of nesting eagles, and single nests were reported from numerous waterbodies throughout the state. New nests were documented in Grafton, Northbridge, Athol, Gloucester, Wenham, and Southborough. In total, at least 26 successful nests fledged a minimum of 46 eagle chicks. Due to the increasing eagle population, the agency decided to reduce the eagle monitoring effort this year, and many pairs were not monitored throughout the season. Therefore, 20 pairs were not visited to determine nesting activity (including Quabbin Reservoir nests), 41 active nests had unknown fates, and only 13 nestlings were banded with a USGS federal band and a field readable state color band uniquely identifying those individuals.

This is the 34th year that bald eagles have raised young in Massachusetts since their restoration. During these 34 years, at least 984 wild-born chicks are known to have fledged, along with an additional eight chicks that were captive-born and fostered into wild nests and another 18 that were captive-born and directly released.

Peregrine Falcon (Falco peregrinus)

Peregrine falcons use the same nesting sites for many years and known falcon nests are monitored during the nesting period. MassWildlife also follows up on reports of new nesting locations to verify these observations. Additionally, MassWildlife coordinates a volunteer network of peregrine falcon monitors who assist with population monitoring of this species in Massachusetts. When possible, MassWildlife staff band chicks in the nests.

Nesting peregrine falcons continue to increase in Massachusetts. Although most nest sites are now on artificial structures (e.g., buildings, bridges), there are several at quarries and an increasing number of historical cliff sites are now being used for nesting. As a result of the increasing number of nesting peregrine falcons, and as is true for eagles, MassWildlife has begun to scale back on monitoring efforts for this species.

During the 2022 nesting season, 43 pairs were documented nesting, but another 19 nest sites where not visited to determine whether they were active. At least 33 pairs laid eggs (eight pairs failed), 25 pairs (76%) are known to have hatched eggs, and all 25 pairs fledged at least one chick (totaling 68 fledged chicks). Six pairs were not monitored closely enough to determine if chicks fledged. Forty chicks (23 males, 17 females) were banded from 15 nests (60% of known successful nests). Five chicks, one of which was banded, are known to have died near the nest site shortly after fledging. These include chicks from Westfield, Winthrop, and Russell. This is the 36th year that peregrine falcons have raised young in Massachusetts since their restoration. During these 36 years, at least 1,006 wild-born chicks are known to have fledged.

Eastern Whip-poor-will (Antrostomus vociferus)

MassWildlife staff and collaborators at the Worcester Polytechnic Institute (WPI) analyzed data from a multi-year study (2018-2020) examining the migratory and wintering ground movement patterns of the eastern whip-poor-will. Specifically, data from 31 miniature GPS loggers (Lotek, Pinpoint) that had been deployed on eastern whip-poor-wills were analyzed. Data from these tags revealed that Massachusetts nesting eastern whip-poor-wills had a broad wintering range extending from South Carolina to Guatemala. However, most of the birds spent the winter on small territories (~5 acres) in the mountainous region of central Mexico. For their territories, the birds selected forested areas and avoided places with extensive agriculture. These results were incorporated into a manuscript and published in the journal Avian Conservation and Ecology (September 2022, https://ace-eco.org/vol17/iss2/art17/). As for migration patterns, all birds that spent the winter south of the United States border took a land-based route around the Gulf of Mexico rather than flying over the large

waterbody. These data highlighted the Appalachian Mountains and Gulf Coast of Mexico as being migratory hotspots for the Eastern Whip-poor-will. On average, birds departed the nesting area in mid-September and arrived on the winter grounds in early November. The migration data was analyzed and prepared for submission to a peer-reviewed journal. This is the first study in the Northeast to link breeding and wintering populations of eastern whip-poor-will, and this information will facilitate strategies for developing full annual-cycle conservation plans for the species.

To examine the movements and habitat use patterns of eastern whip-poor-will at the Montague Plains Wildlife Management Area, an automated radio-tracking system was deployed at the site. This included a main receiver (SensorStation, Cellular Tracking Technologies) and a grid of mini receivers (nodes) deployed throughout the site. In total 13 adult whip-poor-pills were captured, and a tracking tag (PowerTag, Cellular Tracking Technology) was deployed on each bird. The tags were programmed to produce a signal every 45 seconds that could be detected by nodes if the bird remained within the tracking grid. Data was uploaded to a server using the cellular network as well as saved to an SD card within each node. Although analysis of these data is forthcoming, we plan on using the project results to inform management at this as well as other similar pine barrens sites.

The statewide nightjar survey project based on the Nightjar Survey Network's protocol continued into its 11th consecutive year. Twenty-four routes were run in 2022. Surveys once again took place in all the Massachusetts core eastern whip-poor-will areas (e.g., Manuel Correllus State Forest, Montague Plains WMA, Joint Base Cape Cod, Myles Standish State Forest), as well as many important secondary sites. Unlike past years, few chuck-wills-widow were detected, and as usual, no detection of common nighthawk occurred anywhere in the state. The information gathered from these routes is being used to inform regulatory, habitat management, and general conservation decisions.

Reptiles and Amphibians

Northern, Red-bellied Cooter; Federally Endangered

MassWildlife biologists continued to manage and supervise a head-start program for the northern red-bellied cooter (*Pseudemys rubriventris*), which is restricted to Plymouth and Bristol counties in southeastern Massachusetts and has been federally listed as Endangered since 1980. It is now clear that the head-start program, which has run continuously since 1984–1985, has stabilized the species' populations in the Commonwealth. As of 2023, the head-start program is authorized by a 5-year recovery permit from the U.S. Fish and Wildlife Service (USFWS). MassWildlife biologists worked with landowners in Lakeville and Plymouth to protect nests at known residential nesting areas, and distributed the hatchlings to participating institutions, schools, and individuals to care for during the 2022–2023 winter season. Here we report the key statistics from the 2022–2023 head-start season as well as the 2023 nesting season.

Throughout the early summer nesting season in June 2023, MassWildlife worked with landowner partners in Lakeville and Plymouth to identify and protect nests of northern red-bellied cooter. Nine nests were protected at a residential nesting area in Lakeville, and five nests were protected at one residential site in Plymouth. Additionally, single nests were opportunistically protected in Lakeville and Carver. MassWildlife staff worked closely with both landowners to review appropriate protocols for nest protection. Wire cages were placed over the nests to protect them and prevent predation by red foxes, coyotes, raccoons, and skunks.

Hatchlings from the previous year (2022) were transported to 19 head-starting facilities in September 2022, where they remained until May 2023. During the head-starting period, turtles were raised by partners following a standardized protocol. One-hundred and fourteen head-started turtles were released into three ponds on 18 May 2023: Abner Pond, and two adjacent ponds: Maple Springs Brook Reservoir, and Little Long Pond in Plymouth.

Bog Turtle; Federally Threatened

The bog turtle (*Glyptemys muhlenbergii*) is the most imperiled freshwater turtle in New England and has been federally listed as Threatened in the northern part of its range (Massachusetts, New York, Connecticut, New Jersey, Delaware, Pennsylvania,

and Maryland) since 1997. The bog turtle remains one of MassWildlife's highest-priority focal species. MassWildlife staff worked in partnership with the Cooperative Fish and Wildlife Research Unit (CRU) at UMass Amherst to complete a six-year assessment of remaining Bog Turtle populations. No additional populations have been found despite extensive visual surveys, camera trapping, and traditional trapping in suitable habitat. Julia Vineyard, a master's student at UMass Amherst supported by MassWildlife through a Competitive State Wildlife Grant, completed her thesis studying population ecology and spatial ecology of approximately 20 adult bog turtles at both remaining sites. Her work found that both populations appear to be stable, likely as a result of intensive ongoing habitat management. Her models suggest that the total size of the statewide adult bog turtle population is probably around 107 turtles. Her results further indicated that habitat management efforts implemented since the early 2000s have provided quality habitat for bog turtles while also mitigating long-term negative impacts to the populations.

MassWildlife staff continued to work with state wildlife agencies in Pennsylvania, New Jersey, Connecticut, and New York to implement the regional conservation plan for the bog turtle with funding from the Competitive State Wildlife Grant (CSWG) program.

Wood Turtle (Glyptemys insculpta)

The wood turtle has been extirpated from several streams in eastern Massachusetts in recent decades. It is a Regional Species of Greatest Conservation Need (RSGCN) and is petitioned for federal listing. The 13 northeastern states have been working together to conserve this species for about 12 years, supported by two Competitive State Wildlife Grants (CSWGs) and three Regional Conservation Needs (RCN) grants. Having completed a conservation plan for the species from Maine to Virginia in 2018 (Jones et al. 2018), MassWildlife is serving as the lead state on a CSWG to implement the regional conservation plan. Eight partner state agencies in the Northeastern United States are partnering in this initiative. MassWildlife biologists also continued to co-chair the RCN "Turtles" program to its completion in February 2023. In May 2022, MassWildlife conducted statewide surveys and planned a conservation symposium for the species held in July 2023.

Eastern Box Turtle (Terrapene carolina)

MassWildlife staff continue to assist with the implementation of an enhanced offsite mitigation program for the eastern box turtle statewide. MassWildlife's State Herpetologist and Chief of Regulatory Review worked throughout the year with partners from The Nature Conservancy to coordinate habitat conservation for the eastern box turtle using mitigation funds for offsite conservation established through MESA Conservation and Management Permits.

Spotted Turtle (Clemmys guttata)

MassWildlife staff co-authored a conservation plan for the spotted turtle from Maine to Florida (Willey et al. 2022b). MassWildlife coordinated additional field sampling for the spotted turtle in Dukes, Essex, and Barnstable counties, with a major emphasis on islands in Dukes County in partnership with the U.S. Fish and Wildlife Service, where nearly 100 individuals have been marked. Finally, MassWildlife biologists assisted with the organization and planning of a range-wide genetic study and conservation plan for the species and collected additional samples from these three counties to support the regional effort.

Northern Diamondback Terrapin (Malaclemys terrapin)

MassWildlife staff and volunteers initiated a new sampling effort for the species in Buzzards Bay, in partnership with Mass Audubon. Regionally, the northeastern states have funded a three-year project to inventory terrapins using standardized protocols.

Timber Rattlesnake (Crotalus horridus)

Massachusetts' rattlesnakes have dwindled to five isolated populations, several of which appear to be declining. MassWildlife continues to coordinate necessary conservation actions, such as trail closures, signage, and outreach, through three regional working groups in Berkshire County, the Connecticut Valley, and the Blue Hills. MassWildlife also coordinates three "response" teams, which are like the response groups in Vermont and Connecticut, to assist landowners in these regions relocate rattlesnakes from yards. Additionally, in late 2022 and early 2023, MassWildlife continued population studies through contracts with Oxbow Associates, James Condon, and Tom Tyning in the Connecticut Valley and eastern Massachusetts, to

evaluate size, demography, and trend of remaining rattlesnake populations.

Copperhead (Agkistrodon contortrix)

MassWildlife continued to lead population studies through contracts with Oxbow Associates and Tom Tyning to evaluate size, demography, and trend of remaining copperhead populations in eastern Massachusetts and the Connecticut Valley.

Eastern Spadefoot (Scaphiopus holbrookii)

With the help of partners and volunteer monitors, the NHESP continued implementation of Year 7 of a statewide monitoring plan for eastern spadefoot during July–October 2022. However, drought experienced during the preceding spring continued through the summer, and spadefoot breeding was not detected by monitors or reported by the public anywhere in Massachusetts during this reporting period.

The monitoring plan was extended to a "Year 8" during April–June 2023, which brought much breeding activity at select sites across the state. Breeding occurred during or immediately following rain events on April 23 (Southwick), April 30 (Falmouth, Plum Island, Rehoboth, Southwick, Taunton, Wayland), May 20 (Falmouth, Provincetown, Rehoboth, Southwick), and June 17 (Falmouth). Unfortunately, due to predation and pool drying prior to tadpole metamorphosis, none of the aforementioned breeding events in Falmouth, Rehoboth, Southwick, Taunton, or Wayland was successful. Metamorphs were documented from the Provincetown site, and the outcome of the Plum Island breeding event is unknown. Tadpole rescues were implemented at one Rehoboth site and at the Falmouth site, producing one small cohort of metamorphs at each. Spadefoots seemingly did not breed during the reporting period at sites monitored in Edgartown, Sunderland, Westfield, and Westport.

A previously undocumented local population was discovered in Brewster in May, as evidenced by 2 spadefoots calling from a resident's artificial pond; this represents the first reported occurrence of the species in that town. The three breeding events at the Southwick Wildlife Management Area marked the second year in which its introduced spadefoot population (eggs, tadpoles, and metamorphs introduced during 2017–2019) has attempted to reproduce (the other year was 2021). The three breeding events at Mass Audubon's Ashumet Holly Wildlife Sanctuary (Falmouth) marked the third year in which its reintroduced spadefoot population has attempted to reproduce (the other years were 2021 and 2022). To date, the only successful unassisted reproduction (tadpole development to metamorphosis and subsequent dispersal into uplands) confirmed between the two sites has been at a single pool at the Southwick WMA in 2021.

Additional breeding efforts during the reporting period may be discovered following analysis of recordings from passive bioacoustics surveys conducted throughout the breeding season at select pools in Hadley, Sunderland, Southwick, and Wayland.

Marbled Salamander (Ambystoma opacum)

The NHESP invested a strong effort into marbled salamander surveys during late August 2022 through mid-May 2023 to renew occurrence records, follow up on leads, explore for populations not documented previously, improve knowledge of breeding wetland distributions, and investigate statuses of potentially extirpated populations. Droughty conditions during summer 2022, following what was suspected to be a weak breeding effort across much of the state in 2021, gave reason to believe that breeding effort and, therefore, detection probability would be relatively high at most sites during the survey period. Approximately 78 surveys for adult salamanders (nocturnal visual surveys, wetland substrate searches) were conducted during the 2022 breeding season (August–October) among 25 sites distributed among 24 towns. Those surveys yielded detections of marbled salamander at 18 of 75 (24%) wetlands visited. Approximately 89 surveys for larval salamanders (aquatic visual surveys, dip-netting) were conducted during the 2022-23 larval period (November–May) among 21 sites distributed among 21 towns. The 21 sites consisted of 8 that had been surveyed without success during the breeding season, 4 that had at least one marbled salamander observation during the breeding season, and 9 that had not been surveyed at all during the breeding season. Overall, larval surveys yielded detections of marbled salamander at 12 of 86 (14%) wetlands visited. Breeding and larval seasons combined, surveys resulted in discovery of 2 populations not documented previously, observation of 14 breeding wetlands not documented previously, and renewal of records for 15 local populations. However, the

survey results – in combination with survey results from prior years – also cast some doubt on statuses of up to 8 local populations distributed among the towns of Boylston, Holliston, Pepperell, Plainville, Princeton, Shutesbury, Sturbridge, and Uxbridge.

Blue-spotted Salamander (A. laterale)

The NHESP continued its annual, exploratory surveys for pure populations of blue-spotted salamander in Bristol and Plymouth counties. This year's effort focused on a suspected population in Seekonk to (a) identify its primary breeding habitat and (b) improve understanding of its geographic extent. The site was trapped widely during mid-March 2023, and salamanders were confirmed to be using extensive maple-swamp habitat along a riparian corridor and a vernal pool adjacent to the swamp. The Seekonk survey identified a substantial population spanning a moderately large patch of unbroken habitat, much of which is already protected conservation land. The site likely ranks in the top five of the most important pure populations of blue-spotted salamander currently known in the state.

Relatedly, in August 2022, MassWildlife initiated a long-range plan with prospective partners to protect the extensive habitat of a Plympton population of blue-spotted salamander that had been evaluated by the NHESP during winter 2022 and subsequently recognized as perhaps the second most important population in the state. In June 2023, the Department of Fish and Game acquired 44 acres of the site, marking the first major achievement in implementation of the plan.

The NHESP also conducted routine egg-mass surveys during March and April 2023 to renew occurrence records, follow up on leads, and improve knowledge of breeding wetland distributions for blue-spotted salamander populations containing the unisexual lineage. Visiting over 50 wetlands, egg masses of the species were documented at 11 wetlands among 4 sites in the towns of Groton and Middleton; 9 of those wetlands were previously undocumented breeding areas. The species was not detected among 6 wetlands surveyed at a site of previously known occurrence in Holliston.

Jefferson Salamander (A. jeffersonianum)

In anticipation of future timber harvests, the NHESP is working with the Habitat Program and with a private landowner to monitor responses of Jefferson salamander and its habitat to manipulation of forest cover type at two sites: Hawks Brook WMA (Hawley) and Honey Pot WCE (Westfield). The NHESP conducted surveys for egg masses of Jefferson Salamander in April 2023 to collect pre-harvest baseline information on pool utilization and reproductive effort by the species. Jefferson salamander egg masses were documented at 2 of 4 pools surveyed at Honey Pot WCE (first year of pre-harvest monitoring) and at 6 of 9 pools surveyed at Hawks Brook WMA (second year of pre-harvest monitoring).

Following a lead, the NHESP confirmed discovery of a local population of Jefferson salamander in Holyoke that had not been documented previously. Incidentally, egg masses of Jefferson salamander were encountered at two sites in the towns of Hatfield and Southwick while conducting surveys for marbled salamander in April 2023. Neither of the two wetlands was known previously to support Jefferson salamander, and one of the sites represents a local population not documented previously.

Terrestrial Invertebrates

Survey of "Historic" Element Occurrences

The Massachusetts Endangered Species Act ("MESA," M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00) consider "element occurrences" (EOs, or local populations) without an observation documenting the presence of a listed species during the past 25 years to be "historic," and not subject to regulation under the MESA. Therefore, it is important to re-document species' presence (if indeed still present) at historic or soon-to-be historic EOs. In addition to regulation under the MESA, updating of historic EOs keeps the NHESP database current, thus enabling: (1) evaluation of species status statewide, informing needed changes to the MESA list; (2) conservation planning efforts such as the BioMap; and (3) informed land protection and habitat management efforts at particular sites.

In 2022, field surveys of terrestrial invertebrates were conducted with the primary goal of updating historic EOs.

Bolton Flats Wildlife Management Area (WMA)

The Pine Hill section of Bolton Flats WMA, adjacent to the southeast side of Fort Devens in Lancaster and Bolton, consists of rare inland pitch pine—scrub oak barrens and sandplain grassland habitat for a suite of state listed terrestrial invertebrates, birds, and other taxa listed under the MESA. The habitat at Pine Hill is a priority for ongoing habitat restoration and management by MassWildlife.

State listed terrestrial invertebrates at the Pine Hill section of Bolton Flats WMA include: (1) purple tiger beetle (*Cicindela purpurea*, SC); (2) scrub euchlaena moth (*Euchlaena madusaria*, SC); (3) twilight moth (*Lycia rachelae*, E); (4) pink sallow moth (*Psectraglaea carnosa*, SC); (5) pine barrens speranza moth (*Speranza exonerata*, SC); and (6) the pine barrens zanclognatha moth (*Zanclognatha martha*, SC). purple tiger beetle was last documented in 2020. In 2021, both the scrub euchlaena moth and the pine barrens zanclognatha moth were found for the first time in 29 years (both last documented in 1992). In 2022, both the pine barrens speranza moth (last documented in 1992) and the pink sallow moth (last documented in 1993) were found for the first time in 30 and 29 years, respectively. The twilight moth was last documented in 2002 and is a survey priority prior to 2027.

Hentz's Red-bellied Tiger Beetle (Cicindela rufiventris hentzii) at Blue Hills State Reservation

Hentz's red-bellied tiger beetle (*Cicindela rufiventris hentzii*, T) has not been documented at Middlesex Fells State Reservation since 1991 (31 years). In 2022, surveys for this species at Middlesex Fells were unsuccessful. Additional efforts are planned for 2023.

Acadian Hairstreak butterfly (Satyrium acadica) Surveys

The Acadian hairstreak butterfly (*Satyrium acadica*), never a common species in Massachusetts, has been declining in recent decades and is currently under review for listing under the MESA. To inform this review, Garry Kessler, in consultation with the NHESP Invertebrate Zoologist, coordinated volunteer survey efforts by 19 members of the Massachusetts Butterfly Club (MBC). Forty-five sites in 32 towns across the state were surveyed in 2021 and 2022 by MBC members. Most of the sites surveyed were formerly known to be inhabited by the Acadian hairstreak, but new sites with suitable habitat were also surveyed. The Acadian hairstreak was found at only two of the 45 sites, suggesting that it may no longer occur at most of its former sites. Informed by these surveys, the Acadian hairstreak has been proposed for listing under the MESA.

Northeastern Beach Tiger Beetle (Cicindela dorsalis) Monitoring

The northeastern beach tiger beetle is state listed as Endangered, in addition to its listing as Threatened under the federal Endangered Species Act. Population monitoring of this species on Martha's Vineyard was conducted in 2022 by BiodiversityWorks (biological consultants based in Vineyard Haven), in coordination with Mike Nelson, NHESP Invertebrate Zoologist. The peak count of adult beetles (a measure of relative abundance) between 3 subpopulations was 2,066 individuals, indicating a continued stable population on Martha's Vineyard, as has been the case over the past decade.

Puritan Tiger Beetle (Cicindela puritana) Cooperative Recovery Initiative

The Cooperative Recovery Initiative (CRI) for the state Endangered, federally Threatened puritan tiger beetle is led by the U.S. Fish and Wildlife Service (USFWS). Threats to the single population in Massachusetts, inhabiting Rainbow Beach on the Connecticut River, include adverse, artificial hydrology over the past decade, as well as loss of beach habitat to vegetation encroachment. The peak count of adult beetles (a measure of relative abundance) was high in 2022; nevertheless, persistence of the population of puritan tiger beetles at this site is uncertain unless adverse hydrology (frequency and extent of beach inundation due to daily dam releases from late June through early September) is attenuated. The additional threat of excessive growth of vegetation at Rainbow Beach was mitigated by continued annual vegetation control efforts by NHESP staff.

Plants

During the 2022 field season, the State Botanist and Plant Conservation Biologist searched for, discovered, or verified 316 plant population occurrences. A new system, called the Heritage Hub, was put in place for processing incoming records from other parties. Using the Heritage Hub, 2,118 rare plant observations were processed through the platform, with 2,072 accepted, 10 kept as leads as they couldn't be confirmed, and 31 not accepted. Common species that are not tracked accounted for 5 submittals.

For a small state that has been thoroughly botanized for three centuries by many of the nation's leading botanists, new additions to the State Flora are not expected and are quite valuable and important in assessing rare species distribution as well as locating unusual or uncommon habitats. Massachusetts features a rich and diverse flora. The County Checklist of Vascular Plants, First Revision, published by NHESP in 2011, notes a total of 1,814 native plant taxa. Through new discoveries, the count stands at 1,818 at the end of the 2022 field season, with three of the four new species added by the State Botanist. The most recent find, which occurred in the 2022 field season, is of a small fern called upswept moonwort, or *Botrychium ascendens*. In New England, this is only known for a few populations in Vermont. Fortunately, this new native species was found on a WMA, so it's already on protected land.

Surveys by both MassWildlife botanists continued to update existing records of species protected or petitioned for listing status under MESA. These include:

- Willdenow's sedge (*Carex willdenowii*), with new populations found on Mt. Tom.
- Pursh's blue maidencane *(Amphicarpum amphicarpon)*, state endangered and New England's only known population, was observed and the record updated by the State Botanist with volunteers. It had not been seen on one of the two small ponds where it was known since 1990.
- Southern twayblade orchid (*Neottia bifolia)*, state endangered, was found on protected land in Rochester.
- New England blazing star (*Liatris novae-angliae)*, state special concern, is a New England endemic species.
- Hairy honeysuckle (*Lonicera hirsute)*, state endangered, was found on two known sites. Forest thinning and invasive species removal done in part by MassWildlife staff took place at the second population on a WMA in the Berkshires, dramatically improving the habitat for this species at the location of its initial discovery in the 1800s.

The following actions were accomplished for the four federally listed plants:

Sandplain Gerardia (Agalinis acuta); Federally Endangered, Globally Rare

Population censuses or sampling procedures were conducted at nine sites, four locations on Martha's Vineyard and five on Cape Cod. All of these counts require organizing a large group of volunteers, many of which are interns at local nonprofit conservation groups or Joint Base Cape Cod. These are conducted using transects and quadrats to count thousands of small plants in full sun. This is an annual plant, and numbers vary somewhat from year to year, but all populations appear to be relatively stable. Massachusetts holds the world's largest populations of this globally rare species, both on native, natural sites and on restored sites, such as at Frances Crane WMA in Falmouth.

Small Whorled Pogonia (Isotria medeoloides); Federally Threatened, Globally Rare

The numbers at known sites were similar to those in past years. Surveys were conducted at several locations. Populations are showing small declines, possible from highly variable weather due to a changing climate. Some restoration work is being done on one site by The Trustees with grant funding from MassWildlife.

Northeastern Bulrush (Scirpus ancistrochaetus); Federally Endangered, Globally Rare

Two new populations of this species were found in Hampshire County in 2021. Surveys were skipped in 2022 due to high water levels. These will be surveyed again in the 2023 field season.

American Chaffseed (Schwalbea americana); Federally Endangered, Globally Rare

The one large population is holding steady. It was censused with a large group of volunteers using transects, resulting in a count of over 11,500 stems, approximately half in bloom. As is true of sandplain gerardia, Massachusetts has one of the world's largest populations of this globally rare species.

Habitat Management Projects

The Program continued its emphasis on habitat management projects for rare plants during 2022. Under the direction of the Plant Conservation Biologist, control of black swallowwort continued and expanded in 2022 at Mt. Tom where two state-threated plants occur. On a second site in Ware, state endangered purple milkweed is also being fenced and monitored by DCR Water Protection staff in conjunction with the Plant Conservation Biologist. On a third site, a moveable protective fence around a state-endangered species was put in place by DCR staff in consultation with the State Botanist and the result in June of 2023 was very positive, with the plant responding well to this protection.

Aquatic Species

During FY 2023, NHESP's Aquatic Ecologist conducted surveys for odonates, freshwater mussels, and other rare aquatic taxa in MassWildlife's Western, Connecticut Valley, Central, Northeast, and Southeast districts. Below is a summarization of FY 2023's survey efforts.

Dragonflies and Damselflies

Pine barrens bluet (Enallagma recurvatum); state Threatened
Updated two sites at two ponds representing Massachusetts' most western known populations.

Ringed boghaunter (Williamsonia lintneri); state Threatened
Updated at six wetlands and detected at six new wetlands.

Ebony boghaunter (Williamsonia fletcheri); state Endangered
Updated at three wetlands.

Harpoon clubtail (Phanogomphus descriptus); state Endangered
Updated at one site in one river.

Rapids Clubtail (Phanogomphus quadricolor); state Endangered
Detected at one site in one new river.

Brook Snaketail (Ophiogomphus aspersus); state Special Concern
Updated at five sites in four rivers.

Riffles snaketail (Ophiogomphus carolus); state Threatened
Updated at one site in one river and detected at two new sites in two rivers.

Spine-crowned clubtail (Hylogomphus abbreviatus); state Special Concern
Updated 3 sites in one river.

Skillet clubtail (Gomphurus ventricosus); state Threatened
Detected at one site in one new river.

Riverine clubtail (Stylurus amnicola); state Endangered
Detected at one new site in one river.

Mocha emerald (Somatochlora linearis); state Special Concern
Updated at three sites in three wetlands.

Other Species
Dragonfly exuviae surveys performed in May and June 2023 are awaiting species identification.

Freshwater Mussels

MassWildlife is the lead agency on a multistate effort to evaluate the conservation and restoration needs of the state Endangered brook floater. NHESP's Aquatic Ecologist worked with the UMass Cooperative Fish and Wildlife Research Unit to coordinate partner meetings, identify conservation priorities, and to investigate habitat needs of brook floater range wide. The initiative and associated surveys have resulted in updates to other SGCN freshwater mussels.

Brook floater (Alasmidonta varicosa); state Endangered
Updated presence at five sites in three streams. Six individuals from Batchelor Brook were swabbed for DNA to contribute to species range-wide DNA analysis. Follow-up mark-recapture monitoring was conducted at two sites in the Nissitissit to evaluate translocation success from the Sucker Brook Dam removal in 2021. Five of ten individuals translocated were detected with no evident mortalities. Furthermore, three individuals were discovered below the former Sucker Brook dam indicating their survival during the initial sediment- and flow-pulse.

Dwarf wedgemussel (Alasmidonta heterodon); federally and state Endangered
Updated at seven sites in two rivers.

Creeper (Strophitus undulatus); state Special Concern
Updated at thirty sites in four rivers.

Eastern pondmussel (Ligumia nasuta); state Special Concern
Updated at ten sites in three rivers.

Triangle floater (Alasmidonta undulata); SGCN
Updated at twenty-eight sites in four rivers. Fifty triangle floater were translocated from Sucker Brook to the Nissitissit River before a dam removal on Sucker Brook. Follow-up mark-recapture monitoring was conducted at two sites in the Nissitissit to evaluate translocation success from the Sucker Brook Dam removal in 2021. Twenty-five individuals were detected with two evident mortalities.

Eastern pearlshell (Margaritifera margaritifera); SGCN
Updated presence at three sites in one river and two sites in two new rivers. Quadrat surveys were performed downstream of the Sucker Brook dam and several control sites in three rivers to estimate eastern pearlshell densities in response to dam removal. Mussel densities appear to remain stable one year after the dam removal except for a small decrease within the first 75 meters of the former dam.

Data Management and Data Products

In FY 2023, NHESP processed a total of 191 new listed species, natural community, and certified vernal pool records, and updated 528 existing records (Table NH 1).

Table NH 1. Categories of data processed by NHESP in FY 2023.

FY 2023 Totals	New Records	Updates to Existing Records
Vertebrates	38	208
Invertebrates	30	45
Plants	48	264
Communities	9	0
CVPs	66	11
Total	191	528

*One of the three Conservation Data Specialist positions was vacant for half of FY 2023.

Vernal Pool and Rare Species Information System (VPRS)
The reporting piece of the VPRS system was retired in December 2020. Work continues on the VPRS internal workflows to process the accepted reports into our central Biotics database.

MassWildlife's Heritage Hub (Heritage Hub)
A new online system, MassWildlife's Heritage Hub, was developed with EEA-IT and released in January 2021 to capture observation reporting to NHESP. Development continued on the Heritage Hub to build out MESA online filing capabilities, which were released in April 2023.

In FY 2023 alone, 533 new people signed up for Heritage Hub and a total of 2,707 observation reports were submitted, including 113 vernal pool certification forms, 821 plant observation forms, 1,770 animal observation forms, and 3 Natural Community forms.

Once submitted through Heritage Hub, the information is reviewed by NHESP using standard data acceptance criteria for inclusion in our database, and the accepted records are entered into the database by NHESP Data staff.

Other Data Projects
For FY 2023, the NHESP continued to explore methods to improve and advance data collection,

enhance collaboration with external groups, and streamline internal workflows and processes. These projects have included the use of technologies and databases such as Collector and Survey123 mobile applications, ArcGIS Pro, PowerBI, and the PIPLODES/TERNODES database.

This year, NHESP's focus has also been on the replacement of its Environmental Review Access database. The new workflows will streamline the Environmental Review processes and provide greater transparency to the public.

Regulatory Review

Table NH 2. Summary of the environmental reviews conducted during FY 2023.

Review Type	Count
MESA Project Reviews	586
Notices of Intent	483
Forest Cutting Plans	71
MESA Information Requests/Data Releases	285
MEPA Reviews	69
Conservation and Management Permit Applications Received	20
Scientific Collection Permits	127
Other	103
Total	1,744

Relevancy, Collaboration, and Outreach

Chris Buelow

7/12/2022: Sherriff's Meadow Foundation and Vineyard Land Bank, Martha's Vineyard; Consultation of long-term rare species/natural community management, 12 people.

8/17/2022: Manomet, Westborough; Research related to Avian response at Myles Standish, 2 people.

8/23/2022: DCR, Blue Hills; Consulting for Fire-Influenced Community Management, 8 people.

8/24/2022: Norcross Foundation, Norcross; Consulting for Fire-Influenced Community Management, 6 people.

9/29/2022: Gloucester Open Space Committee, Pole Hill, Gloucester; Consulting for Fire-Influenced Community Management, 12 people.

10/13/2022: Division of Ecological Restoration, Mill Brook Bog; Consulting on bog restoration, 10 people.

10/19/2022: DCR Watershed, Quabbin; Consulting for Fire-Influenced Community Management, 6 people.

11/7/2022: TNC, Martha's Vineyard; Consultation of long-term rare species/natural community management, 2 people.

11/14/2022: Manomet, Westborough; Research related to Avian response at Myles Standish, 7 people.

11/21/2022: City of Andover, Lightning Tree Reservation; Consulting for Fire-Influenced Community Management, 16 people.

11/22/2022: North County Land Trust, Keyes Reservation, Gardner; Consulting on sandplain grassland restoration, 6 people.

12/6/2022: DCR, Virtual; Presented on MassWildlife Restoration Projects at annual DCR Research Conference, 100+ people.

12/16/2022: DCR Watershed, Belchertown; Presented on partnership projects to all watershed staff, 50+ people.

1/12/2023: TNC, Northampton; Long-term Planning for western fen restoration, 15 people.

1/17/2023: Nipmuc/Mt. Grace, Virtual; Joint cedar restoration, 10 people.

1/25/2023: UMass Amherst, Virtual; Bee Research in Barrens, 6 people.

2/8/2023: Nipmuc/UMass, Ware River Access; Indigenous Ecology and Fire-Influenced Management, 12 people.

2/23/2023: DCR Watershed, Quabbin; Consulting for Fire-Influenced Community Management, 5 people

2/24/2023: UMass Amherst, Virtual; Bee Research in Barrens, 6 people.
2/27/2023: Nipmuc/DCR, Douglas State Forest; Cedar Collaboration, 9 people.
3/1/2023: UMass Amherst, Montague Plains/Muddy Brook; Montague Plains/Muddy Brook, 5 people.
3/2/2023: TNC, Schenob Brook; Fen Restoration, 6 people.
3/8/2023: UMass Amherst, Birch Hill; Bee Research in Barrens, 5 people.
3/10/2023: TNC, Jug End Fen; Fen Restoration, 5 people.
3/21/2023: Army Corps of Engineers, Birch Hill; Consulting for Fire-Influenced Community Management, 12 people.
3/22/2023: UMass Amherst, Muddy Brook; Bee Research in Barrens, 5 people.
5/2/2023: DCR, Connecticut River; Consulting for Fire-Influenced Community Management, 5 people.
5/6/2023: East Quabbin Land Trust, Muddy Brook; Barrens Site Walk, 20 people.
5/11/2023: Trustees of Reservations, Williamstown; Consultation of long-term rare species/natural community management, 5 people.
5/15/2023: Frankin County Regional Council, Virtual; Largescale pollinator planning, 5 people.
6/22/2023: Westover Air Base, Virtual; Consultation on airfield management, 3 people.

Karro Frost

7/8/2022: Flora Conservanda Regional Advisory Committee Meeting.
9/8/2022: Massachusetts Invasive Plant Advisory Group.
9/28/2022: Ware River Nature Club, Hybrid; Presentation on Invasive Plant Species, 12 people.
10/21/2022: Flora Conservanda Regional Advisory Committee Meeting.
1/14/2023: New England Botanical Society, Westborough; Meeting.
1/19/2023: New England Plant Conservation Program; Task Force Meeting.
2/3/2023: Flora Conservanda Regional Advisory Committee Meeting.
4/8/2023: Massachusetts Association of Conservation Commissions Annual Conference, Virtual; Winter Woody Wetland Plants presentation, 30+ people.
4/9/2023: Massachusetts Association of Conservation Commissions, Virtual; Teach Unit 103 Reading Site Plans and Conducting Site Visits, ~50 people.
5/4/2023: Barnstable Third Grade; Presentation on Rare Plants, ~85 people.
5/5/2032: WBNERR; Presentation on Invasive Plant Species, ~10 people.
5/20/2023: New England Botanical Society, Dorset Mt.; Co-lead Botanical Trip, ~12 people.
6/8/2023: Massachusetts Invasive Plant Advisory Group.
6/16/2023: Flora Conservanda Regional Advisory Committee Meeting.
6/24/2023: SEMPBA; Walk and presentation on coastal plain ponds in Plymouth, ~10 people.

Michael Jones

10/29/2022: Mount Grace, Petersham; Endangered Reptiles and Amphibians, and Citizen Science, 15 people.
11/18/2022: Massachusetts Association of Wetland Scientists, Tower Hill Botanic Garden, Northborough; Advances in Turtle Conservation in Massachusetts, 70 people.
5/1/2023: NEAFWA, Hershey, PA; Co-authored talk on turtles.
5/18/2022: Dickinson Library, Northfield; Citizen science efforts for endangered species, 25 people.

Jacob Kubel

11/30/2022: Board of Directors & Stewardship Committee, Dartmouth Natural Resources Trust, Dartmouth; Ecology and Conservation of the Marbled Salamander in Massachusetts, ~12 people.

Jennifer Longsdorf

1/18/2023: Northeast Bat Working Group Annual Meeting, Virtual; 2023 Massachusetts Bat Work Update, ~200 people.
5/23/2023: Wankinquoah Rod & Gun Club, Middleboro; MA Bat Conservation, ~40 people.

Carolyn Mostello

8/2/2022: MassWildlife; Northeast Coastal Waterbird Cooperators' Meeting, 120 people.
8/24/2022: UConn & Mass Audubon, Great Gull Island workshop; Restoration of Tern Nesting Habitat at Bird Island, 25 people.
October 2022: National Climate Adaptation Science Center & U. Mass Amherst; Stakeholder Driven Research presentation; 20 people.

10/19/2022: Duxbury Beach Reservation & Town of Duxbury, Public Forum; Protection and Regulation of Beach Nesting Birds in Massachusetts: Why, Who, How? 150 people.
12/22/2022: TTOR, Stakeholder Forum; Protection and Regulation of Beach Nesting Birds in Massachusetts, 20 people.
January 2023: USFWS, Workshop; Massachusetts Piping Plover & Least Tern Status Update, 200 people.
1/11/2023: MassWildlife, Natural Heritage & Endangered Species Advisory Committee; MassWildlife's Role in Coastal Waterbird Conservation, 15 people.
2/8/2023: Bristol Co. Agricultural High School; Bristol Aggie Conservation Professionals Series: Coastal Waterbird Biologist, 60 people.
May 2023: Mass Audubon, Training Workshop; Laws and Wildlife Agency Guidelines for Protecting Beach-nesting Birds, 100 people.

Drew Vitz

8/21/2022-8/26/2022: Atlantic Flyway Council, Summer meeting as MassWildlife's representative to the Nongame Technical Section.
11/16/2022: Global Nightjar Conference.
2/26/2023-3/2/2023: Atlantic Flyway Council, Winter meeting as MassWildlife's representative to the Nongame Technical Section.
4/10/2023: Conservation Science Class, Wheaton College; Presentation on NHESP, 25 people.

Sarah Wasserman

11/17/2022: BioMap Launch Event, 50 people.
1/18/2022: BioMap Webinar; 120 people
2/23/2023: Open Space Conference, 208 people.
3/2/2023: Massachusetts Association of Conservation Commissions Conference, 102 people.
3/8/2023: Massachusetts Environmental Education Society Conference, 22 people.
3/18/2023: Citizen Planner Training Collaborative Conference , 25 people.
3/25/2023: Massachusetts Land Trust Coalition/MassLand Conference, 25 people.
5/2/2023: Northeast Association of Fish and Wildlife Agencies Conference, 45 people.

Ms. Wasserman also gave BioMap presentations to the following audiences:

- 15 municipalities; 78 people.
- 7 regional planning agencies/commissions; 29 people.
- 14 land trusts/other non-profits, 244 people.
- 2 educational institutions; 170 people.
- 5 internal presentations, otherwise non-public presentations; 140 people.

Bob Wernerehl

7/8/2022: Flora Conservanda Regional Advisory Committee Meeting.
10/21/2022: Flora Conservanda Regional Advisory Committee Meeting.
10/25/2022: Great Lakes Botanists Working Group Meeting.
12/17/2022: Mass Audubon, Winter Bird Count.
1/14/2023: New England Botanical Society Meeting at MassWildlife.
1/19/2023: New England Plant Conservation Program, Task Force Meeting; Massachusetts NHESP Updates, 25 people.
2/3/2023: Flora Conservanda Regional Advisory Committee Meeting.
2/22/2023: Great Lakes Botanists Working Group Meeting.
3/9/2023: Presentation, Virtual; Sandplain Grasslands: A Rare Habitat at the Waquoit Bay Headquarters, 75 people.
3/21/2023: Great Lakes Botanists Working Group Meeting.
5/12/2023: Thomas Prince School, Princeton; Outdoor presentation/plant ID Workshop for 6th graders, 44 people.
6/16/2023: Flora Conservanda Regional Advisory Committee Meeting.
6/22/2023: Organize and help lead large group of botanists to survey TNC properties in the Berkshires, 20 people.

Presentations to the Natural Heritage and Endangered Species Advisory Committee

The Committee moved to quarterly meetings as of January 2021.

- A Checklist of the Bees of Massachusetts: Summary and Highlights; independent researcher Michael Veit
- Update on Next Round of MESA List Changes: Eve Schlüter, Assistant Director
- MassWildlife's Role in Coastal Waterbird Conservation; Carolyn Mostello, Coastal Waterbird Biologist
- Bridging Climate Change Research and Agency Priorities at MassWildlife; Rebecca Quiñones, Stream Biology Project Leader

Natural Heritage and Endangered Species Advisory Committee

Full Members

Mark Mello (Chair)
Timothy Flanagan (Vice Chair)
Kevin Powers (Secretary)
William Brumback
Joseph Larson (part-year)
Matthew Sisk (part-year)
Wayne Petersen
Dave Small

Associate Members

Andy Finton
Russ Hopping

Natural Heritage and Endangered Species Program Staff

Eve Schlüter, Ph.D., Assistant Director
Tara Boswell, GIS Manager (part-year)
Daniel Bove, Restoration Ecologist
Chris Buelow, Senior Restoration Ecologist
Caren Caljouw, Prescribed Fire Program Manager
Jason Carmignani, Aquatic Ecologist
Melany Cheeseman, Endangered Species Review Assistant
Karen Dolan, Finance & Projects Administrator
Alexandra Echandi, Endangered Species Review Biologist (part-year)
Alex Entrup*, Prescribed Fire and Habitat Restoration Ecologist
Tom French, Consulting Biologist (part-year)
Karro Frost, Conservation Planning Botanist
John Garrison, Freshwater Turtle Biologist (part-year)
Lauren Glorioso, Endangered Species Review Biologist
Amy Hoenig, Senior Endangered Species Review Biologist
Emily Holt, Senior Endangered Species Review Assistant
Tara Huguenin, Conservation Data Specialist
Michael Jones, Ph.D., State Herpetologist
Alec Kaisand, BioMap Outreach Specialist (part-year)
Jacob Kubel, Conservation Scientist
Jesse Leddick, Chief of Regulatory Review (part-year)
Jennifer Longsdorf, Natural Heritage Program Coordinator
Lisa MacGillivray, Habitat Mapping Biologist/Conservation Data Specialist
Meredith Maglio, Endangered Species Review Assistant (part-year)
Sarah Maier, Information Manager
Misty-Anne Marold, Senior Endangered Species Review Biologist
Tim McGuire, Endangered Species Review Biologist (part-year)
Carolyn Mostello, Coastal Waterbird Biologist
Michael Nelson, Ph.D., Invertebrate Zoologist
David Paulson, Senior Endangered Species Review Biologist (part-year)
Amanda Veinotte, NHESP Project Coordinator
Sarah Wasserman, BioMap Outreach Specialist (part-year)
Bob Wernerehl, Ph.D., State Botanist
Ryan Williams, Conservation Data Specialist (part-year)
*Wildlife section staff

5 The Outreach and Education Program

Nicole McSweeney, Assistant Director of Outreach and Education

Overview

The Outreach and Education (O&E) Program has the responsibility of keeping the public apprised of laws, policies, and management practices related to wildlife conservation. Outdoor skills clinics, wildlife education workshops, conservation presentations, publications, and digital platforms provide the public with experiences that lead to a greater understanding, appreciation, and support of Massachusetts wildlife conservation. Staff lead a variety of outreach efforts to connect the public with nature, and promote hunting, fishing, and other wildlife-based recreation opportunities. The Outreach and Education section includes hunter and angler education, wildlife education, R3 and relevancy, human dimensions, publications, media relations, customer service, and other communications.

R3 and Relevancy

In Massachusetts and throughout the nation, our society is in the midst of a rapid and unprecedented change which has profound implications for wildlife conservation and the future of state fish and wildlife agencies. Urbanization, technology, and demographic change are leading to shifting values and perspectives related to conservation. The number of hunters and anglers—the historic base of financial support for MassWildlife and other state fish and wildlife agencies—is declining and disconnection from nature is increasing. While all Massachusetts residents and visitors benefit from MassWildlife's work to conserve wildlife, protect open space, and preserve clean air and water, MassWildlife currently relies heavily on funds generated by hunters, anglers, and trappers. In response, MassWildlife has prioritized efforts to increase participation in and support for hunting, fishing, and the shooting sports through recruitment, retention, and reactivation (R3), while also deploying strategies to better engage with all residents including those who will never hunt, fish, shoot, or trap (relevancy). Understanding public values and ensuring the public appreciates how MassWildlife's efforts are relevant to them is key to increasing broad support for conservation.

R3 Plan Development

The Massachusetts R3 Plan, which identifies priority activities and actions associated with five primary R3 strategies (see Figure OE 1, below), was finalized. Considered a living document, as R3 partnerships evolve and activities are initiated and evaluated, the R3 Plan focuses on activities that MassWildlife intends to complete with the help of partners. As projects are implemented, new recommendations may be developed over time. This R3 Plan was presented to the Fisheries and Wildlife Board in April 2023, as well as to over 30 partners during the Massachusetts R3 Summit in June 2023.

The R3 Plan is written as a summary, not a detailed accounting of all planned MassWildlife and partner R3 efforts. For specific projects, bi-annual R3 Work Plans are developed under the guidance of the R3 Coordinator that contain key implementation steps, team members, and timelines. The planning process and R3 projects fall under the calendar year. In FY 2023, MassWildlife implemented and evaluated 9 projects for Calendar Year 2022.

2022 R3 Projects

1. Plan R3 Summit
2. Identify barriers of new hunters and anglers
3. Promote fishing in urban communities
4. Develop hunting and fishing videos and resources
5. Identify public fishing spots in prioritized urban areas
6. List all WMAs on Google Maps
7. Deliver pheasant hunting outreach campaign
8. Launch Hunters Share the Harvest venison donation program
9. Organize WMA Cleanups

Figure OE 1. Massachusetts R3 Plan Goals and Strategies

Moving forward, the planning process was completed for CY 2023–2024 R3 projects. Implementation of these projects will start on July 1, 2023, and go until December 31, 2024. The projects identified for 2023–2024 are listed below.

2023–2024 R3 Projects

1. Develop a Statewide R3 Task Force
2. Evaluate R3 in-person programs, and work with partners to scale the programs shown to be most effective
3. Identify and work with nontraditional R3 partners
4. Develop a mentoring campaign
5. Enhance GoFishMA Map
6. Develop signage for self-guided tour of sandwich hatchery
7. Better understand the barriers and needs of land trusts/towns to open their property to hunting
8. Work with partners to offer at least one public range in each district
9. Develop clear messaging that portrays hunting as a safe activity and highlights its benefits to conservation

Human Dimensions

The Human Dimensions Coordinator continued to lead the agency's efforts to better understand the constituents it serves. Information about the general public and the angling and hunting community is critical for tailoring messaging and developing communication strategies. Primary and secondary research of Massachusetts' residents informs data-driven decision making related to programs, management, and policies. A comprehensive understanding of the behaviors and cognitions of the sporting community informs recruitment, retention, and reactivation strategies. Baseline and continuing research provides a means for informing and evaluating the agency's outreach efforts and progress.

Human Dimensions Research

During FY 2023, data mining and primary and secondary research focused largely on (1) license database inquiries related to angling and hunting customers (2) the development and execution of surveys to document hunter behaviors and cognitions (3) establishing a strategy and mechanism to document general public attitudes, opinions and interests (4) serving as a subject matter expert to improve the licensing system (5) providing input and data support to R3 planning and R3 program

evaluation, and (7) development of the Hunter Education Volunteer Instructor Survey.

License Database Inquiries

Numerous data requests from staff typically requiring multi-year data exports via MassWildlife's database management system (SQL) were processed in FY 2023. Typically, larger data exports are then queried further to develop distinct angler, hunter, and trapper customer segments. During this period, data exports were used to support and inform marketing campaigns; campaign evaluations; press requests; efforts to reach BOW participants; estimate churn rates; and other related targeted outreach and communication efforts. Given the recent license price changes, there was considerable effort to examine license sales to document and quantify the impact on revenue and sales. Many of these efforts are detailed elsewhere in this report. Similarly, license data requests were used to generate sample frames for MassWildlife's annual hunter survey as well as focused survey efforts of other customers.

Hunter and Angler Surveys

Multiple hunter survey as well the annual trapper surveys were conducted during this fiscal year. In addition to generating sample frames, the work also included guidance and support of questionnaire development and survey implementation strategy. Survey instruments were developed or refined to capture the behaviors, attitudes, opinions and preferences of deer hunters, pheasant hunters, turkey hunters, and other customers.

A new angler survey was developed and executed during this period. The survey focused on capturing anger behaviors, motivations, site preferences, species preferences, and catch disposition with additional focus on trout fishing behavior and preferences. The survey will support warmwater and coldwater fisheries management plans as well as information needs and communication preferences. Over-sampling of new lapsed anglers was conducted to inform the R3 Barriers Project described below . Analysis of survey data focused on comparing and contrasting the behaviors, motivations, and preferences of anglers with different levels of experience to inform recruitment, retention, and reactivation programming decisions.

Public Attitudes

During this period, final results of the Massachusetts Public Attitudes Survey were presented to the Relevancy sub-committee and other key staff.

Licensing System Improvements

Quality assurance and quality control checks of the MassFishHunt system continued, improving the efficiency and testing the accuracy of queries.

R3 Plan & Programmatic Evaluations

During this period, data analysis continued in support of MassWildlife's R3 reports and presentations, including a presentation to the Massachusetts Fisheries and Wildlife Board. R3 support included participation and leadership of the R3 annual projects to document barriers to fishing and hunting, as well as Retrospective Analysis to evaluate many other completed R3 projects. As part of annual R3 planning efforts, in-depth analysis of license buyers was presented to MassWildlife staff to inform decision making (i.e. R3 Kickoff Analysis). Massachusetts continues support Regional R3 Program Evaluation efforts with some work being done to assist states in submitting program data. During this grant period a survey to assess the current R3 program offerings and capacity of Massachusetts and national partners was executed. Findings were presented at the R3 Summit.

Hunter Education

During this period, initial planning for the Hunter Education Volunteer Instructor survey began. The multi-mode survey, (email and mail), was sent on June 26th to 313 Volunteer Instructors active since 2018. The contact strategy included a pre-notice letter signed by the Hunter Education Working Group and underscored the importance and purpose of the survey. The multiple contact survey strategy and presumably a salient survey topic is expected to produce a relatively high survey response rate. Results will be presented in the next FY. This survey will inform program decision making and support for Volunteer Hunter Education Instructors.

Website

With assistance and input from other sections, O&E staff create and maintain MassWildlife web content. The website is hosted by the Mass.gov content management system. As such, the agency website has access to existing content management system features and is limited by the constraints of the state system. Because of the agency's large volume of web visitors, MassWildlife is often asked to test new website features and proved feedback for feature development. This fiscal year, O&E staff worked with Mass.gov to pilot the new chatbot feature. The "Ask MA" chatbot is a conversational interface that assists users searching for information. MassWildlife provided content for Ask MA to help users with the most common agency-related searches: fishing and hunting licensing, sick/young/injured/dead wildlife, hunting and fishing maps, wildlife as pets, and trout stocking.

In addition to routine content updates, a variety of substantial projects were completed this fiscal year that increased the accessibility and quality of MassWildlife web content.

WMA Fact Sheet Migration

The MassWildlife website contains a narrative description of almost all Wildlife Management Areas. These narratives are linked to from the popular MassWildlife Lands Viewer web map. Over 230 WMA fact sheets were migrated from pdf format into html web pages. Html web pages are easier to view on mobile devices (which are used by over 65% of MassWildlife website visitors); can be read by screen reading devices (used by some users with disabilities); can make use of the Mass.gov Google Translate widget for translation into about 40 languages; more readily appear in search engine queries (which can elevate the agency's profile/relevance); and are much easier to edit and maintain over time. Information about the Wildlands Fund and the agency mission were added to each of the WMA web pages so that visitors would have an opportunity to learn about MassWildlife. The new WMA web pages were submitted, along with shape files, to Google for addition to the Google Maps application. When WMA web page links are added to Google Maps, details about our properties and information about the agency will gain a new level of exposure.

Waterbody Fact Sheet Migration

Work was started to migrate waterbody narratives from pdf to html format. (See previous bullet for benefits of html format.) These narratives, often called "pond maps" since the narrative is accompanied by a depth map of the pond or lake, are extremely popular with Massachusetts anglers. These narratives are linked to from the Go Fish MA! map. O&E staff, in collaboration with Fisheries staff, created a template for the new narratives that include all current information as well as new photos of boat ramps, shore access, and parking. Links to buy a fishing license along with fishing tips and places to fish were also included. The bulk of this migration work will be completed in FY 2024.

Hunting And Fishing Self-learning Content

A variety of hunting and fishing video tutorials and written tips were created during this fiscal year including pheasant hunting tips, pheasant processing and preparation, featured pheasant-stocked WMAs, online scouting how-to, black bear preparation and recipes, deer field dressing how-to, and ice fishing for beginners. New web pages were created to house this growing library of self-learning content. Taking advantage of new Mass.gov page flexibility, an updated Learn to Hunt Program page was also created.

Other New Web Content

Other projects included 15 snakes of Massachusetts pages, BioMap Habitat Management Practices pages, a landing page for MassWildlife's Hunters Share the Harvest Program, and a new Summer Turkey Survey web form.

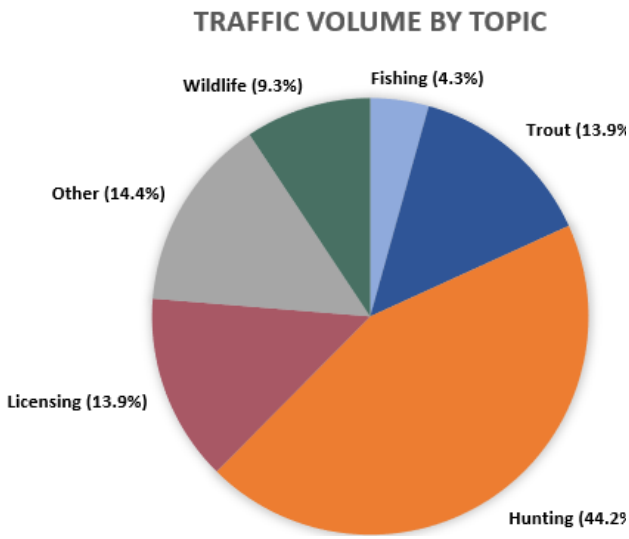
Web Analytics

MassWildlife relies on Google Analytics to measure web traffic and user engagement. During this fiscal year, Mass.gov switched from Google Universal Analytics (UA) to Google Analytics 4 (GA4). According to GA4, MassWildlife web pages were viewed about 4.5 million times. Visitors spent an average of 1 minute and 13 seconds per page actively engaged with the content. Tagging and reporting are configured by the Mass.gov team and were incomplete for a portion of the fiscal year. The FY 2023 report generated by GA4 shows substantial decreases in MassWildlife web traffic (-1.6M). It is unclear whether the differences shown in this fiscal

year's report result from the change in analytics platform or from a change in user behavior. Other companies have reported similar differences in reporting results between UA and GA4 and reports over the last 8 years show a steady volume of MassWildlife web traffic, so it is likely that the discrepancy is due to the analytics tool.

MassWildlife has 1,682 web pages and 2,597 documents. MassWildlife web pages receiving the most traffic in FY 2023 were similar to those of previous years: trout stocking, fishing and hunting licensing, hunting and fishing regulations, general wildlife information (Figure OE 2).

Figure OE 2. MassWildlife web pages receiving at least 1,000 pageviews, grouped by topic.



Note: Hunting includes species regulations, where to hunt information, hunting tips, and Hunter Education; Wildlife includes wildlife rehabilitation, learn about wildlife pages, and wildlife-as-pets regulations; Other includes gun ownership in Massachusetts, the MESA list, and MassWildlife and NHESP home pages. The increased proportion of hunting web volume is likely caused by the creation and promotion of hunting self-learning content during this period.

Improvements To Web Analytics Reporting Capabilities

Reporting on general web trends within the agency is difficult since data must be downloaded and tagged manually. Work was completed this fiscal year to label all MassWildlife pages so that Google Analytics reporting is easier and more meaningful in the future.

MassFishHunt

The Department of Fish and Game launched a new MassFishHunt online licensing system on December 1, 2021. O&E staff continue to provide feedback on overall system functionality. Due to limitations of the licensing vendor, there are no longer opportunities to pursue or develop new outreach or events tools tied to licensing customers. O&E staff have started participating in efforts to secure a new license vendor contract.

Social Media and Digital Communications

Facebook

In FY 2023, MassWildlife continued utilizing its Facebook page (Facebook.com/masswildlife) to engage with its constituents. As the most-used social media platform in the world, Facebook has been a useful tool in helping MassWildlife share information about fish and wildlife issues in the Commonwealth; communicate about research projects; and promote agency events, programs, job openings, and donation opportunities. MassWildlife posts to its Facebook page several times a week with a variety of content. MassWildlife continued to see an increase in followers in FY 2023, closing the year with 64,250 followers (up from 59,000 followers at the close of FY 2022). MassWildlife also uses Facebook to listen to what constituents are saying and engage with the public by responding to their comments and questions. Facebook is a primary tool for the agency to deliver high-quality customer service and answer constituent inquiries. Over 330 private messages were received through MassWildlife's Facebook page in FY 2023, in addition to thousands of comments on posts, offering significant opportunities for engagement with MassWildlife's constituents.

Instagram

MassWildlife uses its Instagram account (@mass.wildlife) to engage with the public. The number of followers has been steadily growing over time (2,800 in FY 2018; 9,600 in FY 2019; 15,200 in FY 2020, 18,100 in FY 2021; 20,100 in FY 2022; and

22,260 in FY 2023). Instagram is a widely used, fast-growing social media platform, especially among younger audiences.

YouTube

MassWildlife publishes video content to our YouTube channel (Youtube.com/MassWildlife). Videos are then embedded back onto our Mass.Gov website. As MassWildlife increases efforts to develop self-learning resources for hunters and anglers, we continue to add video content to our YouTube channel. In FY 2023, we created and added new videos like how to fillet sunfish, how to fillet a trout, how to prepare a pheasant, how to render bear fat, how to use online resources for scouting, and how to field dress a deer.

Newsletter

Twelve issues of the electronic "MassWildlife Monthly" newsletter were published this fiscal year around the first of each month. Over the past year, the number of newsletter subscribers continued to grow; in July 2022, 134,853 received the newsletter, and in June 2023, that number had risen to 167,331.

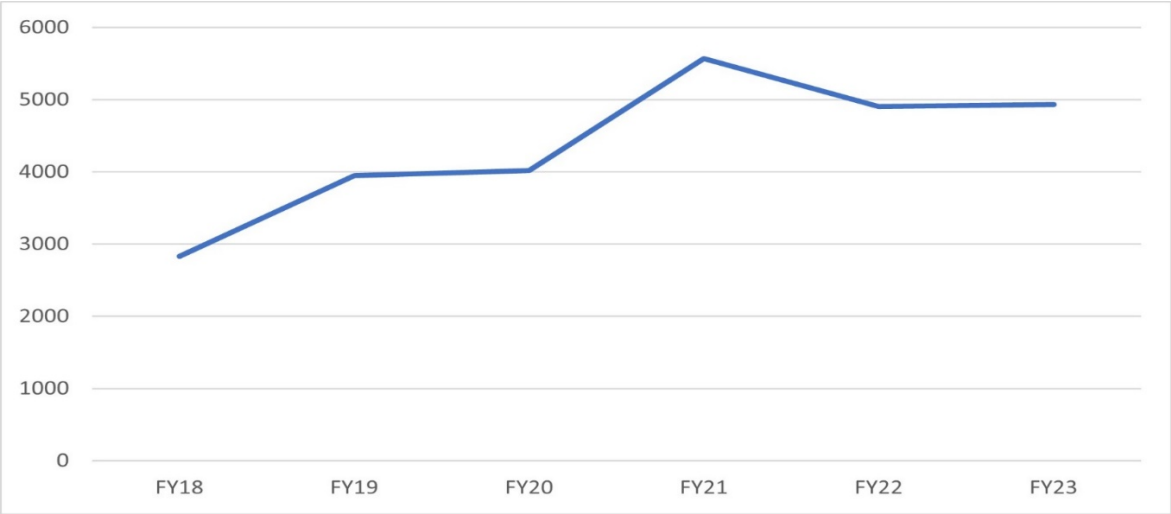
This represents a substantial increase in the number of subscribers from 5 years ago (22,930 in June 2017). A check box to subscribe on the MassFishHunt online licensing system has been the main driver of increased subscribers. Other sign-up tools like links to subscribe on the MassWildlife website and social media, as well as signage at fairs and shows have also increased the number of subscribers.

The newsletter is sent using Constant Contact, an email marketing service. Press releases to media and advisories alerting subscribers and license holders of new regulations, special events, public meetings, and hearings were also sent out through Constant Contact. On average, 48% of subscribers opened the MassWildlife Monthly email in FY 2023, which is considered an "above industry average" open rate. (The average open rate across all industries using Constant Contact is 34% as of September 2023.) This is also up from MassWildlife's open rate in recent years (32% open rate in FY 2021 and 38% in FY 2022). Improvements to subject line headers may have caused the improvement. MassWildlife's average newsletter click rate was 5.2%, which is well above the average of 1.3% for Constant Contact users, indicating that MassWildlife is producing high quality, engaging content that subscribers want to read.

Agency Emails

Email is an important communication channel for members of the public to ask their questions. MassWildlife receives and responds to thousands of emails each year on topics ranging from animal/track identification, problems with wildlife, fishing and hunting regulations, and MassWildlife properties. The number of agency emails remained steady in FY 2023 (see Figure OE 3). In addition to the 4,577 emails to mass.wildlife@mass.gov, 374 general inquiries from the public came in via the masswildlife.news@mass.gov email.

Figure OE 3. Number of emails received by MassWildlife in the last six fiscal years.



Marketing

Fishing and Hunting Promotions

MassWildlife works to recruit, retain, and reactivate hunters and anglers through innovative communication techniques. Targeted emails were used to retain and reactivate hunters and anglers throughout the year with license renewal reminders, and emails also delivered important information such as regulation changes, notices about education opportunities, and hunting and fishing tips. Social media also plays an important role in marketing for R3 through regular posts about hunting and fishing tips, game and fish recipes, tips, and places to enjoy hunting and fishing. MassWildlife did not run any paid digital ads to promote hunting or fishing in CY 2023.

NHESP Fundraising

State Income Tax Donation Promotion

An article about donations through Line 32A ("Endangered Species Conservation") of the state income tax return was featured in both the February and March editions of the MassWildlife Monthly e-newsletter, which was sent to over 156,000 subscribers. The tax-form donation was also promoted on social media during the spring.

Media Relations

Current media protocol procedures allowing EEA agencies to interact directly with media have strengthened long-established media relationships and resulted in valuable connections with new media contacts. The protocol has also expanded MassWildlife's ability respond to the news media in a timely fashion and to proactively pitch stories.

For years, MassWildlife has utilized a media service to collect news coverage that mention the Division or other related key words. This service primarily reports on print newspaper sources with some information on television and digital coverage. The service provides reporting on reach and value of the articles mentioning MassWildlife.

To supplement the media service, internet alerts are used to monitor mentions of MassWildlife on digital platforms. These alerts can provide insight on the number of articles mentioning the agency, but cannot provide detail on audience, reach, or media value. Used together, the media service and internet alerts capture most of the MassWildlife-related coverage in the news.

MassWildlife tracks media outreach effort, coverage resulting from these efforts, as well as coverage that is not a result of outreach ("organic"). Media inquiries are also tallied regardless of whether they result in a published news story.

Media Outreach Efforts

MassWildlife maintains a media contact list and sends monthly e-newsletters to those contacts. At the end of FY 2023, there were 868 contacts on the list from media outlets across Massachusetts and in the region (891 at the end of FY 2022 and 664 at the end of FY 2021). Reporters are given the option to be added to the list whenever they contact MassWildlife about a story. Contacts on the media list received 12 e-newsletters from MassWildlife over the course of the year. In addition, MassWildlife sent or collaborated on the following advisories that were distributed to statewide or regional media lists:

- Mount Watatic Land Protection Celebration (9/20)
- Birch Hill WMA Habitat Tour (9/22)
- BioMap Event (11/3)
- Forest Lake Earth Day Clean-up (3/29)
- Bioreserve Clean-up (3/26)
- Coy Hill Clean-up (6/1)

Media Coverage (from outreach)

As in previous years, a variety of media outlets published or aired stories utilizing content from MassWildlife's monthly e-newsletter, advisories, collaborative press releases, and social media posts. MassWildlife outreach can result in a request for more information or for an interview with staff. Some media outlets summarize MassWildlife content in recurring outdoor segments or calendars, while other outlets reprint the original content exactly as written. The following is a list of topics promoted by MassWildlife that resulted in the most media coverage in FY 2023:

- Bat week (18)
- Tips for coyote breeding season (14)
- Black bears active and searching for food (13)

- Drivers break for wildlife (13)
- Events (12)
- Hunters Share the Harvest (10)
- Spring trout stocking (9)
- Turkey brood survey (9)
- Protect your chickens from bears (8)
- Ice safety (8)
- Fish, wildlife, and drought (7)
- Habitat grant winners (6)
- General hunting (6)
- What to do if you see a bear (5)
- Why did the turtle cross the road? (5)
- Why it's normal to find fawns alone (5)
- Spring turkey season (4)
- ADP deadline reminder (4)
- Wild brown trout management in Deerfield River (4)

Media Inquiries

MassWildlife fields requests from the media on a variety of topics throughout the year. Some requests are sparked by agency outreach, while others arise organically—often from a wildlife situation that readers or viewers are noticing locally. A portion of these media inquiries result in published coverage. In FY 2023, the agency responded to 273 inquiries (Table OE 1).

Table OE 1. Media inquiries by type

Media Type	Number (%) of inquiries
Newspaper/digital	72 (37.9%)
Digital only	9 (4.7%)
Television/digital	56 (29.4%)
Radio/digital	49 (25.8%)
Magazine	4 (2.1%)

Media Coverage by Species (Organic)

Aside from MassWildlife media outreach efforts, media coverage, including fish, wildlife, and agency-related topics, occurs organically. MassWildlife receives media inquiries that may arise from an unexpected wildlife sighting or problems with wildlife in a town or region. MassWildlife Outreach and Education staff work with subject-matter biologists to provide clear messaging on how to coexist with wildlife. MassWildlife staff responded to requests for information and/or interviews from reporters on a wide variety of topics. These inquiries often result in digital, print, radio, or television coverage. Topics generating the greatest volume of articles in FY 2023 included:

- Black bears (91): Almost half of bear-related coverage came from bears being spotted in the southeast during May and June of 2023 (these bear stories continued into FY 2024). The remaining coverage came from bear sightings and bear conflicts in other parts of the state.
- Coyotes (61): Most of the coyote news coverage focused on residents having problems with coyotes in their neighborhoods. Nearly a third of stories were covering issues related to coyotes in Nahant.
- Wild Turkeys (18)
- Peregrine banding in Lowell, Springfield, and Boston (13)
- Piping plovers (8)

Earned media coverage resulting from MassWildlife outreach or from organic media inquiries is tallied using a paid news clip service, and by internet news alerts set by staff. MassWildlife was mentioned at least 507 times during the fiscal year (Table OE 2). Agency mentions appeared in 126 different newspaper, digital, radio, and television outlets. These outlets ranged from small community papers to major regional and even national media outlets, including The Boston Globe, Boston Herald, The Berkshire Eagle, The Lowell Sun, The Republican, Athol Daily News, Worcester Telegram and Gazette, The New York Times, WGBH radio, WBUR radio, Boston.com, MassLive, Patch, Wicked Local, Boston25, NBC Boston, WWLP TV, and Spectrum 1.

Table OE 2. Media coverage by type

Media Type	Number (%) of Mentions
Newspaper/digital	278 (54.9%)
Digital only	100 (19.8%)
Television/digital	86 (16.9%)
Radio/digital	39 (7.7%)
Magazine	3 (<1%)

Photography

Key Projects

The Magazine Editor and Publications Manager takes photographs for both magazine articles and other publication, web, and social media use, in addition to gathering many more photos from staff and from magazine contributors.

In FY 2023, 34 photo shoots were conducted, including still image and video shoots of beaver pond wildlife during the 2022 drought, the Massachusetts Junior Conservation Camp, spearfishing, gray treefrogs, striped skunk, waterfowl research and tracking, American kestrel research and tracking, various portrait shoots in support of the magazine and other agency activities, the Freshwater Sportfishing Awards Ceremony, spring ephemerals, trout stocking, a larval shad release on the Taunton River, and a plant-focused photo shoot at Hawley Bog.

Signage And Publications

Massachusetts Wildlife *Magazine*

Massachusetts Wildlife is a 40-page, full-color quarterly magazine with approximately 17,000 subscribers and a standard publication print run of 23,000 copies, which provides surplus for individual publication sales; handouts; and promotions at programs, shows, and fairs. Four issues of Massachusetts Wildlife were produced in FY 2023 (Number 3, 2022 – Number 2, 2023) covering fisheries, wildlife, and outdoor-related subjects, including wildlife research; rare and endangered species; general nature interest; and how-to articles for the hunter, angler, and nature observer, continuing a long tradition of producing articles that will be useful as references on various subjects for many years to come.

Issue Number 3, 2022:

- The Stockbridge Solution by Andrew Madden
- Tip of the Spear by Bert Comins
- A Foundation for Our Heritage by Wayne MacCallum
- The Many Joys of Fishing by Matt Perry
- The Great Race by Troy Gipps

Issue Number 4, 2022:

- Our Journey with Peregrine Falcons by Ursula and David Goodine
- The Final Piece of the Watatic Puzzle by Anne Gagnon
- Managing Drought by Adam Kautza
- When Water Recedes: A Photo Essay by Troy Gipps and Dean Cerrati
- Editorial: A Changing of the Guard by Mark Tisa

Issue Number 1, 2023:

- Fly-Fishing Follow-Up: First Day on the Water by Jed Proujansky
- An Internship for the Birds by Grace Gavin
- Backwater Memories and the Birth of a Hunter by Emma Ellsworth
- Great Meadows Waterfowl Research by H Heusmann
- Editorial: Landscape-scale, Collaborative Wildlife Conservation by Mark Tisa

Issue Number 2, 2023:

- An Unexpected Gift (fishing-related article) by Troy Gipps
- Sportfishing Awards Turns 60 by Steven Mattocks
- Modern Deer Management by Martin Feehan
- A Boy from Buckland by Sharon Kennedy-Haas
- Editorial: Helping Hunters Share the Harvest by Mark Tisa

Magazine Subscription Promotion Efforts

MassWildlife contracts with a vendor (Infonet) for magazine subscription fulfillment and promotion. The beginning of the fiscal year, July 1, 2022, showed 18,666 subscribers for the magazine; by June 30, 2023, there were 16,933 magazine subscribers. One-year subscriptions account for 62% of the total, 38% of subscriptions are for two or more years. In FY 2023, a total of 9,302 new and renewal subscriptions were sold.

During FY 2023, Infonet sent 11,704 regular renewal mailings to 4,772 subscribers whose subscriptions

were about to expire. The total cost of these mailings was $4,213 and they resulted in revenue of $21,447 from 2,214 renewals. There were no nominee promotions mailed in FY 2022.

Cash Acknowledgements

Any person who sent in a 1-year paid subscription on their own (Not a "Bill Me" sign up) is mailed an acknowledgement, thanking them for the subscription. The subscriber is invited to "step up" to receive a special 7 for $7 offer. In FY 2023, 672 cash acknowledgements were sent out at a cost of $242. There were 136 1-year subscribers who stepped up, resulting in revenue of $952.

Gift Subscription Promotions

In fall/winter 2022, three effort gift subscription renewal promotion mailing of 7,033 pieces were sent to 2,300 donors who have given gifts, at a cost of $2,531 resulted in revenue of $23,922. A smaller promotional mailing at a cost of $2,344 went out to 6,236 subscribers who did not have a history of giving gift subscriptions. The results were 679 orders for $4,074 in revenue.

Other Magazine Outreach/Distribution Efforts

Magazine subscriptions are available for purchase through the MassFishHunt licensing system. A guest account, for those people who are not purchasing licenses, offers subscribers the convenience of purchasing with a credit card. During FY 2023, 153 one-year subscriptions and 708 two-year subscriptions were sold through the MassFishHunt system.

Magazines at Meetings, Conferences, Exhibits, Fairs, and Education Workshops

Copies of back issues of magazines are made available at a variety of events where MassWildlife may have a display table or present an informational session or other public event. Magazines are distributed at all Project WILD teacher workshops, wildlife education programs, and Hunter Education courses.

Regulations

The Guide to Hunting, Freshwater Fishing, and Trapping

The 2023 Guide to Hunting, Freshwater Fishing and Trapping was again produced in cooperation with J. F. Griffin Publishing Co., as part of a multi-year contract with this publisher. The full-color, glossy-stock, 56-page booklet includes a digest presentation of the fishing- and hunting-related laws and regulations and other information of interest to the sporting community. The print run was 140,000 copies in FY 2023 and guides were distributed at MassWildlife offices and license vendor locations, as well as at fairs, shows, and events.

Migratory Game Bird Regulations Brochure

The Publications Editor also worked closely with the Wildlife Program to update, publish, and distribute the 2023–2024 Migratory Game Bird hunting regulations brochure. The brochure contains season dates and bag limits for migratory birds, which are not available for release when the Guide to Fishing, Hunting, and Trapping Laws is published.

Wildlife Management Area Signage

Outreach and Education staff completed work on several interpretive signage projects. Ten Help Protect Coastal Plain Ponds signs were designed, printed, and installed at MassWildlife properties in the Southeast District. Work has begun to develop signage for Sandwich Trout Hatchery. Improved signage and a self-guided tour will support the hatchery's tens of thousands of annual visitors. Working with a Worcester Polytechnic Institute student intern (and former Angler Education Instructor), staff developed a draft of the informational signs. Content and design will be finalized in FY 2024.

O&E Staff occasionally assists other entities with interpretive sign creation. During the reporting period, MassWildlife assisted the Department of Conservation and Recreation with imagery and content that will be used at Ponkapoag Pond.

Fact Sheets and Related Publications

Outreach and Education staff facilitated the creation of several new publications during FY 2023. Staff helped create a new fact sheet promoting the benefits of hunting for deer management. This fact sheet has been a useful resource when consulting with towns or other landowners that are considering opening access for deer hunting. Staff supported the creation of a 17-page BioMap booklet and BioMap brochure by developing and editing content, providing photography, and working with a graphic design contractor to finalize layout. O&E staff also edited content and laid out MassWildlife's Teaching with Trout Teachers handbook.

Outreach Events

MassWildlife staff interacted with the public at a variety of outreach events during this fiscal year. In addition to exhibits and events directly organized by MassWildlife, MassWildlife's O&E Section coordinated with other agency staff on outreach events by providing support with event promotion and registration; helping to staff the agency's display at events; and developing targeted display and presentation materials such as images and/or content for use in presentations, posters, and handouts.

Events

MassWildlife staff represented the agency at a variety of events. Staff led activities, provided publications, and answered questions from the public at the following venues: Huntstock (Westminster), Springfield Sportsmen's Show (West Springfield), New England Fishing Expo (Boxborough), Adaptive Recreation Fair (Brighton), Springfield Pancake Breakfast (Springfield). To celebrate Earth Week, MassWildlife hosted family trout stocking events in Worcester, Palmer, Plymouth, Pittsfield, Woburn, and Westfield. MassWildlife hosted Wildlife Management Area Cleanups at properties in Lenox, Palmer, Freetown/Fall River, Ashby, West Brookfield. MassWildlife also held a launch event for the new BioMap tool and website.

Informational Public Presentations

MassWildlife staff gave presentations on a variety of topics to organizations, clubs, and municipalities across the Commonwealth. Presentations were given to the following groups: Backcountry Hunters and Anglers, Town of Duxbury, The Norcross Wildlife Foundation, various local chapters of Trout Unlimited, Mount Grace Land Conservation Trust, Town of Hopkinton, Worcester County Conservation Districts, Dartmouth Natural Resources Trust, White Oak Land Conservation Society, Sterling Department of Conservation and Recreation, Town of Malden, Kestrel Land Trust, Northfield Bird Club, Waquoit Bay National Estuarine Research Reserve, Berkshire Environmental Action Team, and Athol Bird and Nature Club.

Guest Lectures

MassWildlife staff presented to classes at high schools and universities, including at Westfield State University (Eastern Spadefoot Conservation, Human Dimensions of Wildlife Management), Clark University (Habitat Management), UMass Amherst (Massachusetts Environment, Law, and Regulations; Massachusetts Deer Management; Habitat Management), Wheaton College (Bird Conservation in Massachusetts), and Bristol County Agricultural High School (Conservation Professionals Series).

Land and Habitat Events

A variety of events and guided walks took place at MassWildlife properties that highlighted land acquisition or habitat management projects. Habitat tours and walks were held at Birch Hill WMA, Frances Crane WMA, USACE Birch Hill Dam Project, Mashpee Pine Barrens WMA, Mill Brook Bogs WMA, and Leyden WMA. A land acquisition celebration event was held at Mount Watatic in Ashburnham.

Wildlife Conservation Education Programs

With the continued impact from the COVID-19 pandemic on the education system, in-person education programs were still limited during FY 2023. Numbers in this report reflect a few in-person and virtual hybrid programs offered during the fiscal year.

Project WILD in Massachusetts

Project WILD is one of the most widely used wildlife-focused conservation and environmental education programs among educators of students in kindergarten through high school. Project WILD addresses the need for human beings to develop as responsible citizens of our planet and fosters responsible actions toward wildlife and related natural resources. Using balanced curriculum materials and professional training workshops, Project WILD accomplishes its goal of developing awareness, knowledge, skills, and commitment. In Massachusetts, K-12 educators are trained as facilitators to offer workshops for other educators from across the Commonwealth. Project WILD and Growing Up WILD: Exploring Nature with Young Children was developed by the Council for

Environmental Education (CEE), is administered by the Association of Fish and Wildlife Agencies (AFWA) and sponsored in Massachusetts by MassWildlife with support from the Massachusetts Sportsmen's Council.

Project WILD and Aquatic WILD (K-12)

These workshops are targeted for educators working with children in grades K-12. The Project WILD activities are terrestrial ecosystem based while the Aquatic WILD curriculum focuses on aquatic ecosystems. There are strong connections in these curricula to Science, Technology, Engineering, and Math (STEM). The annual in-person facilitator gathering and recognition was held at Fare Thee Well Wholeness Center. The Project WILD Coordinator remained connected to and supported facilitators by meeting in-person for outdoor field sessions and discussions.

Growing Up WILD: Exploring Nature with Young Children

This early-childhood (ages 3-7 years) education program for educators, caregivers, teachers, and families builds on children's sense of wonder about nature and invites them to explore wildlife and the world around them through a wide range of activities and experiences. Growing Up WILD (GUW) is a tool for helping fish and wildlife agencies meet their conservation goals through recognizing children start developing attitudes towards wildlife and nature at an early age and providing knowledge and skills to early childhood educators so they may teach about nature. GUW provides suggestions for outdoor nature-based recreation, conservation suggestions for each activity, and activities that families can do together. This lays a foundation for acquiring increased scientific knowledge and problem-solving skills. There is a continued strong focus on connecting Growing Up WILD to STEM. In FY 2023, two hybrid Growing Up WILD workshops were offered through Bridgewater State University and Elms College and one in-person workshop was offered.

Junior Duck Stamp Program (JDS): Connecting Youth with Nature through Science and Art

An innovative way to teach children about wetlands and waterfowl, the Junior Duck Stamp Conservation and Design Program provides K-12 students the opportunity to learn scientific principles, connect with their natural world, and artistically express their knowledge of the beauty, diversity, and interdependence of wildlife.

JDS also provides a curriculum for students, educators, home school, and non-formal groups designed to spark youth interest in habitat conservation through science, art, math, and technology, made available to student artists and educators upon request. In Massachusetts, the Junior Duck Stamp Program is sponsored by MassWildlife and U.S. Fish and Wildlife Service, with support from the Massachusetts Sportsmen's Council.

Students in grades K-12 from across the Commonwealth submitted 185 pieces of artwork to this "Conservation through the Arts" program. Entries were received from public, private, and home-schooled students; individuals; and private art studios. In-person judging took place with the colored pencil drawing of a Black-bellied Whistling Duck by Jasmine Wang, Luckie Art Studio, selected as Best of Show. Jasmine's artwork represented Massachusetts at the National Competition. The statewide traveling exhibit, comprised of a combination of the top 100 pieces of art, resumed during this timeframe with four venues hosting the artwork.

General Wildlife Education Programs

Customized wildlife education programs presented by the Wildlife Education Coordinator focused on diverse audiences: students, scouts, educators, and adult audiences (retirement communities, adult day centers, nursing homes). The Wildlife Education Coordinator was the Naturalist-in-Residence for the preschool at Nashoba Brooks School offering experiential nature-based education aimed at inspiring wonder and stewardship of the local wildlife and ecosystems.

Massachusetts Envirothon

MassWildlife's involvement in this 36th annual natural resource (wildlife, soil, water, forest) program, continues through the efforts of Wildlife Education Coordinator Pam Landry. She hosts teacher and student workshops, serves on the education subcommittee of the steering committee, prepares the wildlife exam, provides wildlife-related information to the Current Issue question, and attends the competition. In FY 2023, the Envirothon was held at The Blackstone River and Canal Heritage

State Park for 107 urban and rural high school students representing 18 Massachusetts communities.

The North American Conservation Education Strategy (CE Strategy)

An array of tools developed by state fish and wildlife agencies support conservation educators who offer fish and wildlife-based programs that guide students in grades K-12 on their way to becoming involved, responsible, conservation minded citizens. The CE Strategy delivers unified research-based Core Concepts and messages about fish and wildlife conservation, translated into K-12 academic standards to shape students' environmental literacy, stewardship, and outdoor skills. Resources included in the toolkit included: landscape investigation, schoolyard biodiversity, field investigation, fostering outdoor observation skills, using technology in field investigations, applying systems thinking, and much more. Material was directly distributed to educators when applicable or they could download resources at www.fishwildlife.org (focus area, conservation education, tool kit).

Massachusetts Junior Conservation Camp

In August 2022, the Conservation Camp held its 2-week session at Boy Scout Camp Moses in Russell. Facilities at this location are an improvement from the past location. Approximately 100 campers attended. As in the past, MassWildlife staff assisted by providing support through advertisement, providing instructors, and coordinating arrangements with other state-based instructors. MassWildlife staff and MassWildlife program volunteers offered Basic Hunter Education and Bow Hunter Education courses to the campers; provided instruction in wildlife management, fisheries management, game preparation, and cooking skills; conducted the information quiz that evaluates the participant's comprehension of outdoor information and skills presented during the camp session; and participated in the graduation ceremonies.

Northeast Wildlife Trackers Conference

The Northeast Wildlife Trackers mission is to organize, uplift, and inspire a community of wildlife trackers across the Northeastern U.S. and Canada. Their vision is to be an inclusive, welcoming community of naturalists, educators, tracking enthusiasts, and conservation professionals who share a passion for wildlife tracking and foster a sense of connection across social and geographic boundaries. As a representative on the annual conference planning committee, the Wildlife Education Coordinator hosted an in-person conference at MassWildlife Field Headquarters.

Teaching with Trout

Please see page 31 of the Fisheries Program report for details of this program in FY 2023.

Hunter Education Program

It is the mission of the Massachusetts Hunter Education Program to protect the lives and safety of the public, promote the wise management and ethical use of our wildlife resource, and encourage a greater appreciation of the environment through education.

The Hunter Education Program is a public education effort providing instruction in the safe handling of firearms and other outdoor activities related to hunting and firearm use. The Massachusetts Hunter Education Program evolved from a survey conducted in 1954 indicating that 75% of Massachusetts hunting accidents officially involved minors. In that same year, the State Legislature enacted a law establishing a Hunter Education Program providing instruction in basic hunter education. The program is administered by the Massachusetts Division of Fisheries and Wildlife, and courses are taught by MassWildlife staff and certified volunteer instructors. Courses are open to everyone, and no one shall be denied access to the course because of age, sex, race, color, religion, or country origin. All courses are offered free of charge.

Hunter Education Courses

In Fiscal Year 2023, five of the six disciplines were offered including Basic Hunter Education, which is mandated to qualify for a first-ever hunting license, and Trapper Education, which is mandated to apply for a trap registration certificate. The limitations that were established during the Coronavirus pandemic were suspended in FY 2023 and we resumed previously established course arrangements, regained access to more course locations, and more volunteer teaching teams resumed course offerings. In addition, a free self-study online Trapper Education course is now recognized to qualify for a

MA Trap registration certificate. Individuals who successfully complete the North American Basic Trapping Course at https://conservationlearning.org can now use that course completion certificate to apply for a MassWildlife Trapper Registration Certificate.

A total of 103 courses were offered with 2, 543 students participating in the Hunter Education Program. Course offerings increased by 61% from the previous fiscal year and student participation increased by 43.6% percent from the previous fiscal year levels.

Students are asked to volunteer information on age, gender, and ethnic background. The following is a summary of course offerings and statistics on student participation in FY 2023.

Basic Hunter Education

Starting January 1, 2007, anyone 18 years of age or older who wishes to hunt for any bird or mammal in the Commonwealth must successfully complete a basic hunter education course, unless such person has held a license to hunt before January 1, 2007. The basic hunter education course is a standardized curriculum that provides information on the safe handling and storage of hunting arms and ammunition, hunting laws and ethics, wildlife identification, wildlife management, care and handling of game, basic survival skills, and first aid. The Certificate of Completion issued to graduates is recognized in all U.S. states, Canada, and Mexico. Eighty-three courses were offered in FY 2022. Basic Hunter Education course offerings increased by 76% from the previous fiscal year and are comparable with the yearly levels experienced prior to the pandemic. In FY 2023, a total of 2,694 participated and 2,553 successfully completed the course including 625 minors (under 18 years of age), 273 minorities and 411 women.

Trapper Education

The Trapper Education curriculum standards were revised in May 2018 by the IHEA in cooperation with the Association of Fish and Wildlife Agencies. Trapper Education is mandatory in Massachusetts for Problem Animal Control (PAC) agents and first-time trappers to apply for a trap registration certificate. This course includes both classroom work and field training and focuses on the best management practices for trapping. Students learn the proper use of traps, the identification of furbearing animals and their habitats, trapping laws, ethical trapper behavior with an emphasis on the responsible treatment of animals and landowner relations. Three courses with an in-person component were offered, with a total of 140 participants. One hundred and eighteen participants successfully completed the course including 3 minors (under 18 years of age), and 8 women.

Bowhunter Education

The Bowhunter Education curriculum standards were revised in May 2017 by the IHEA in cooperation with the National Bowhunter Education Foundation. This course is designed for both the experienced and novice hunter. Course topics include the selection of equipment, safety, ethics, bow-hunting methods, and care and handling of game. Bowhunter Education is not required in Massachusetts and a Bowhunter Education certificate does not qualify a person to purchase a first-ever Massachusetts Hunting or Sporting license. A Massachusetts Bowhunter Education Certificate is accepted, however, in other jurisdictions that do mandate the successful completion of the course. Ten courses were conducted. A total of 272 students participated and 267 successfully completed the course including 43 minors (under 18 years of age), 8 minorities and 36 women.

Waterfowl Identification and Hunting

This course teaches the identification of migratory waterfowl. It emphasizes the importance of distinguishing waterfowl in flight and includes identifying fall and winter plumage patterns and the size, shape, and flight characteristics of the birds. This course also covers hunting safely from boats and blinds and waterfowl hunting techniques. This course was not offered in FY 2023.

Black Powder (Muzzleloader) Education

This course was revised and piloted in FY 2018. The course includes the identification and selection of hunting equipment, state laws and regulations regarding muzzleloader hunting and the safe handling of muzzleloaders. A live-fire segment has been added. One course was conducted. Eleven students participated and all successfully completed the course.

Map, Compass & Survival
This 1-day course includes both classroom work and field training. Topics include instruction on the use of a compass and topographical map for land navigation as well as wilderness survival. Six courses were offered. Ninety-nine students participated and 95 successfully completed the course including 6 minors (under 18 years of age) and 27 women.

Hunting and Shooting Skills Programs

National Archery in the Schools Program in Massachusetts

This program offers international-style target archery training with a nationally standardized education package in cooperation with state fish and wildlife agencies across the country. The National Archery in the Schools Program and the Archery Trade Association have partnered with MassWildlife and the Massachusetts Outdoor Heritage Foundation to promote student education and lifelong interest and participation in the sport of archery in Massachusetts.

The National Archery in the Schools Program (NASP) is a part of the in-school curriculum, generally a physical education class. The NASP curriculum is designed for students in grades 4-12, and includes social studies, mathematics, and physical education. This provides all students with an opportunity to try archery, including many who may not otherwise show an interest in the sport. MassWildlife provides a 1-day Basic Archery Instructor training for physical education teachers within schools/districts that plan to participate in NASP. In addition, MassWildlife coordinates the ordering and delivery of program equipment for the schools. To receive training, schools must obtain the NASP equipment kit, at a cost of about $3,500. The kit includes 11 Matthew Genesis bows, 122 arrows, 5 targets, 1 arrow curtain, and 1 tool/repair kit.

Eight trainings were held in FY 2023 to train 39 physical education teachers from 18 different schools. Archery loaner kits were used at 23 different schools and 2 organizations across the commonwealth. 8,445 students across Massachusetts participated in NASP as part of their in-school curriculum.

Young Adult Pheasant Program

The Massachusetts Young Adult Pheasant Hunt Program was developed by MassWildlife to provide an opportunity for 12-17-year-old Hunter Education graduates to practice firearms safety, develop shooting skills, and participate in a special pheasant hunt with an experienced pheasant hunter in a friendly environment. The program is run by participating local sportsmen's clubs. This program is a comprehensive, three-part recreational program. Shooting instruction and practice take place during the summer or early fall; the pre-hunt workshop is held a week or two before the youth pheasant hunt; the actual hunt is scheduled by the individual clubs for any one of the six Saturdays prior to the mid-October start of the regular pheasant hunting season.

The Young Adult Pheasant Program was run at six different clubs across the state in FY 2023. A total of 45 youth participated in the event.

Youth Turkey Hunt Program

This program was developed by MassWildlife in cooperation with the Massachusetts Chapter of the National Wild Turkey Federation (NWTF) to provide an opportunity for 12-17-year-old Hunter Education graduates to practice firearms safety and turkey-hunting techniques, develop shooting skills, and participate in a special 1-day turkey hunt under the one-on-one guidance of an experienced turkey hunter.

The program is offered by participating local sportsmen's clubs in partnership with local chapters of the NWTF. It is a comprehensive, three-part outdoor education program designed to give young hunters an opportunity to acquire some of the specialized skills associated with the activity. Hunter safety is emphasized to help build the confidence of the inexperienced hunters so that they will feel comfortable when in the field.

The Youth Turkey Hunt Program takes place in the spring. Shooting instruction, practice, and the pre-hunt workshop take place two or three weeks prior to the day of the hunt. The actual turkey hunt takes place on the Saturday prior to the last Monday in April.

Participants can select either an online or in-person option for the youth turkey seminar. In FY 2023, 106 students completed the online course.

In addition to the online course, in-person seminars were also offered. Due to the high number of online participants clubs were offered to either keep the in-person seminar as they have been in the past which was youth turkey seminars, or they could make them learn to hunt seminars that included anyone interested in learning more about turkey hunting ages 12+. This would allow a bigger reach for learn to hunt classes while also meeting the youth turkey requirement. Eight clubs held in-person seminars. Of the eight clubs, three of the clubs turned their seminar into a learn to turkey hunt seminar, and one club piloted a "range day" for adults and youth. A total of 24 adults and 31 youth participated at a turkey seminar.

Learn to Hunt Program

The Learn to Hunt program, which is geared to target new hunter education graduates who need more information before they were comfortable hunting for a particular species, held a combination of virtual and in-person classes in FY 2023. Below is a summary of the learn to hunt classes that were offered:

- Deer Hunting 101 Online Course: 100 registered*
- Deer Hunting 101 In-Person Course: 10 participants
- Scouting for Deer Online Course: 158 registered*
- Scouting for Deer In-Person Course: 9 participants
- 2 Turkey Calling Seminars: 42 participants
- Spring Learn to Hunt Turkey Seminars (see youth turkey)

Becoming an Outdoors Woman Program

Becoming an Outdoorswoman (BOW) is a program designed for women ages 18 and older, providing basic outdoor skills sessions.

Three BOW events were held that included a fishing clinic and two mentored programs: a deer program that included an online class, an in-person field day and a mentored hunt; and a turkey program that included a seminar followed by a mentored hunt.

- Fishing Clinic: 15 registered*
- Turkey Seminar Only: 9 participants
- Turkey Seminar & Mentored Hunt: 6 participants
- Deer Seminar only: 2 participants
- Deer Seminar and Mentored Hunt: 13 participants

*This number indicates the number of registered participants. We were not able to collect the number of attended participants. Typically, our no-show rate for online courses is 50% and is 20% for in-person classes.

Fishing Skills Programs

The Angler Education Program is the main component of the Aquatic Resource Education Program. The other component is Aquatic Project WILD, overseen by the Wildlife Education Specialist. The Angler Education Program has several components designed to introduce people to fishing and the outdoors, including family fishing festivals, fishing clinics, fishing classes, and our own Fishing Tackle Loaner Program

The Angler Education Program operates with the cooperation of trained volunteers. All instructors complete a volunteer application and undergo a background check through the Criminal Offender Record Information (CORI) system. Volunteers are given pertinent information about MassWildlife and the Angler Education Program, and then begin apprenticing at program events. Instructors are recruited mostly from fishing events, positive publicity, and word of mouth. There are currently 104 volunteer instructors on the books of which approximately 44% were active during FY 2023.

Family Fishing Festivals

Weekend family fishing events are set up as an introduction to fishing, where we make available rod-and-reel combinations, terminal tackle, and bait at no charge, and when the manpower allows, instruction in casting, fish identification, knot tying, baiting, cleaning, and filleting. There is typically no pre-registration required and folks can show up anytime within the festival timeframe. There were 13 weekend family fishing events totaling approximately 2,035 people.

Family Fishing Clinics

Fishing clinics, while short in duration, are a very popular program component. These clinics are typically co-sponsored by town recreation departments, sporting clubs, Boy or Girl Scouts groups, summer camps, and or other state or federal agencies. Clinics are generally two to three hours, involving a short overview of fish, fishing, safety, and ethics, followed by casting instruction and a healthy dose of fishing. Pre-registration is typically required for these clinics, and participation is kept small enough to allow the instructors to work with participants one-on-one. For FY 2023, we ran 64 fishing clinics for approximately 2000 participants.

Fishing Classes

We also teach a small handful of fishing classes annually. These are generally specialty fishing skills classes like fly tying, adult-only "learn to fish" classes, and a few school-based fishing classes. For FY 2023 we taught 1 fly tying class for 10 people, and 8 in school basic fresh-water fishing classes with the Auburn High School Physical Education Program, for approximately 150 students.

Fishing Tackle Loaner Program

The Angler Education Program keeps and maintains fishing equipment onsite for loan to various groups throughout the state. Loaner equipment includes basic spin casting rods, spinning rods, saltwater rods, as well as fly rods and fly-tying equipment and even ice fishing gear. Equipment was loaned to various groups and agencies, including the DCR, the U.S. Army Corp of Engineers, the USFWS, various sporting clubs, scout troops, and church groups. Along with the fishing gear, the necessary terminal tackle and various fishing education program handouts are also provided. In FY 2023, 27 groups requested equipment totaling 782 pieces of fishing equipment.

Trout-stocking programs

The Angler Education Program assists with spring trout stocking programs with various schools and public groups throughout the state. These are both an outreach and education program. A short talk is given about who we are, and what we do, as well as some trout culturing and stocking information. After which the group helps us release the fish. Aside from the annual and ever popular "Earth Day" trout stocking programs handled by our 5 district offices each spring, the Angler Education program cooperated with one of district stocking programs, as well as four other trout stocking programs in FY 2023 totaling approximately 350 people attending.

Outreach and Education Staff

Nicole McSweeney, Assistant Director
Timothy Bradbury, Hunter Education Specialist
Jill Durand, Clerk
Steve Foster, Hunter Education Program Logistics
Troy Gipps, Magazine Editor and Publications Manager
John Gutzeit, Learn to Fish and Hunt Programs and Outreach Specialist
Colleen Hubbard, Clerk (partial year)
Astrid Huseby, R3 Coordinator
Jim Lagacy, Angler Education Coordinator
Pam Landry, Education Coordinator
Susan Langlois, Hunter Education Program Administrator
Jody Simoes, Human Dimensions Project Leader
Emily Stolarski, Communications Coordinator

6 Districts and Wildlife Lands Report

Trina Moruzzi, Assistant Director of Operations

Overview

Most people who interact with MassWildlife do so through one of the agency's five Wildlife Districts. The District offices are this agency's field stations, administering wildlife lands, conducting on-site monitoring and management, enhancing recreational opportunities, and addressing the wildlife issues pertinent to their regions.

District personnel sell hunting, fishing, and trapping licenses; stamps; and selected permits as well as distribute the Guide to Massachusetts Hunting, Freshwater Fishing, and Trapping and other materials related to the sale of hunting, fishing, and trapping licenses to vendors throughout their District.

District Supervisors are the agency's point persons, spending many hours with civic and conservation groups, including sportsmen's clubs and county leagues, and responding to inquiries from interested citizens. They provide technical advice on wildlife matters, particularly on matters pertaining to the handling of nuisance animals. In this context, District staff serve to educate the public and deal with a large number of bear complaints, deer damage complaints, questions about coyotes, and other issues dealing with the impact of wildlife on human activities, and vice versa. They also assist officers from the Massachusetts Environmental Police (MEP) to ensure public adherence to wildlife laws and regulations.

District staff participate in a wide variety of biological survey and monitoring programs initiated by MassWildlife's fisheries and wildlife section staff based at the Westborough Field Headquarters (FHQ); see the individual section reports for the status of these projects. Among the biological survey projects conducted by District staff were the black bear habitat study, rare turtle surveys, a bald eagle breeding survey, whip-poor-will surveys, New England cottontail surveys, and stream and lake surveys. District personnel also conduct census counts of wild turkey, woodcock, ruffed grouse, and bobwhite quail.

District staff members continued to enhance recreational opportunities throughout the state by stocking brown trout, eastern brook trout, rainbow trout, tiger trout, and broodstock salmon into waters scheduled to receive them. Prior to releasing trout, they monitor the water quality of the designated lakes and streams.

Districts also provide additional upland gamebird hunting opportunities by releasing ring-necked pheasants on WMAs and in open covers (i.e., suitable habitat on public land).

Land stewardship is an important MassWildlife priority and has become a large part of District activities. District stewardship biologists assist the wildlife land acquisition effort to prioritize lands to be acquired by locating titles, landowners, and boundaries, and walk prospective sites with DFG Land Agents to assess natural resource values and identify any issues that may present stewardship challenges on particular parcels. Stewardship biologists are responsible for communicating with members of the public, abutters, landowners, and other stakeholders on stewardship activities, including monitoring lands under Conservation Restrictions (CR) and stewardship of MassWildlife's WMAs. They also work to mitigate encroachments by adjacent landowners on our WMAs. Staff have also been assisting the Habitat program by participating in prescribed burns as part of the Biodiversity Initiative on several WMAs throughout the state. They also participate in habitat restoration and management work on the WMAs in their region by cutting brush, mowing, trimming trails, assisting with forest cutting operations, planting shrubs, performing herbicide treatments on invasive vegetation, and maintaining roads and parking areas. They emplace gates, erect signs, and make other

arrangements related to the protection and management of the agency's lands.

Staff worked diligently this year to ensure acquisition, maintenance, and stewardship of the thousands of acres of wildlife lands acquired and managed by MassWildlife remain protected wildlife habitat. Wildlife lands stewardship staff based in Westborough coordinated stewardship efforts with the five districts in the form of habitat management, boundary marking, survey contracts, and signage to improve access to wildlife lands.

Conservation Restriction (CR) landowner relationships and CR monitoring are a large part of land stewardship. The DFG-MassWildlife Conservation Restriction portfolio has grown to 228 CRs and over roughly 53,560 acres (See Appendix C for details). Annual letters were sent to all landowners, and monitoring visits were conducted at 202 of the CR properties. Stewardship staff conducted in-person monitoring visits across the state to ensure compliance with the terms and conditions of the CR. Stewards reviewed three Forest Management Plans and/or amendments and six Forest Cutting Plans to ensure compliance with the CR. This work is often done in coordination with DCR, and, if rare species habitat is present, with NHESP as well. The DCR Working Forest Initiative Cost Share program was able to fund five of these plans. Boundary marking contractors were hired to supplement work done at the districts and completed roughly 14 miles of boundary marking. Surveys were completed by contracted engineers for three properties. The surveys were required to resolve complex stewardship issues. As a result, MassWildlife is better enabled to manage the land and keep it open for public enjoyment.

As detailed below, MassWildlife's continued focus on strategic land acquisition and long-term stewardship underscores its commitment to protecting the best land for wildlife, biodiversity, and wildlife-dependent recreation in Massachusetts. Each of the five District Supervisors as well as the Wildlife Lands Stewardship Coordinator are part of the DFG Lands Committee, ensuring land acquisition and conservation of DFW lands. The DFG land acquisition team looks forward to another productive year of conserving land for habitat biodiversity as well as hunting, fishing, trapping, wildlife viewing and other nature-based recreation.

Land and Conservation Restriction Acquisitions in FY 2023

The Department of Fish and Game (DFG) and MassWildlife work together to protect the Commonwealth's most important fish and wildlife habitat and to expand the public's access to land and inland waters for hunting, trapping, and fishing and compatible passive recreation. To accomplish this dual mission, DFG's Land Protection Program uses funding from the Environmental Bond and the Wildlands Fund to purchase land and conservation restrictions (CRs) from willing landowners who seek to conserve their property. Some landowners donate their land or a CR on it to DFG, which may result in an income tax deduction for the landowner.

FY 2023 was another successful year for protecting land across the Commonwealth, yielding a multitude of public benefits. Land agents in each of the five districts completed a total of 39 projects covering 3,187.18 acres for a total cost of $6,301,455 (Figure DL 1; Table DL 1). Land acquired in fee and through a CR improves Massachusetts' climate-change resiliency by protecting forests that absorb carbon dioxide and wetlands that work to absorb floodwaters in extreme weather events, and by connecting large tracts of wildlife habitat to allow plants and animals the ability to adapt to changing weather conditions. A current inventory of all MassWildlife properties is listed in Appendix C, the Wildlife Lands, Table C 1.

Figure DL 1. FY 2023 Acquisitions by Town and Acreage

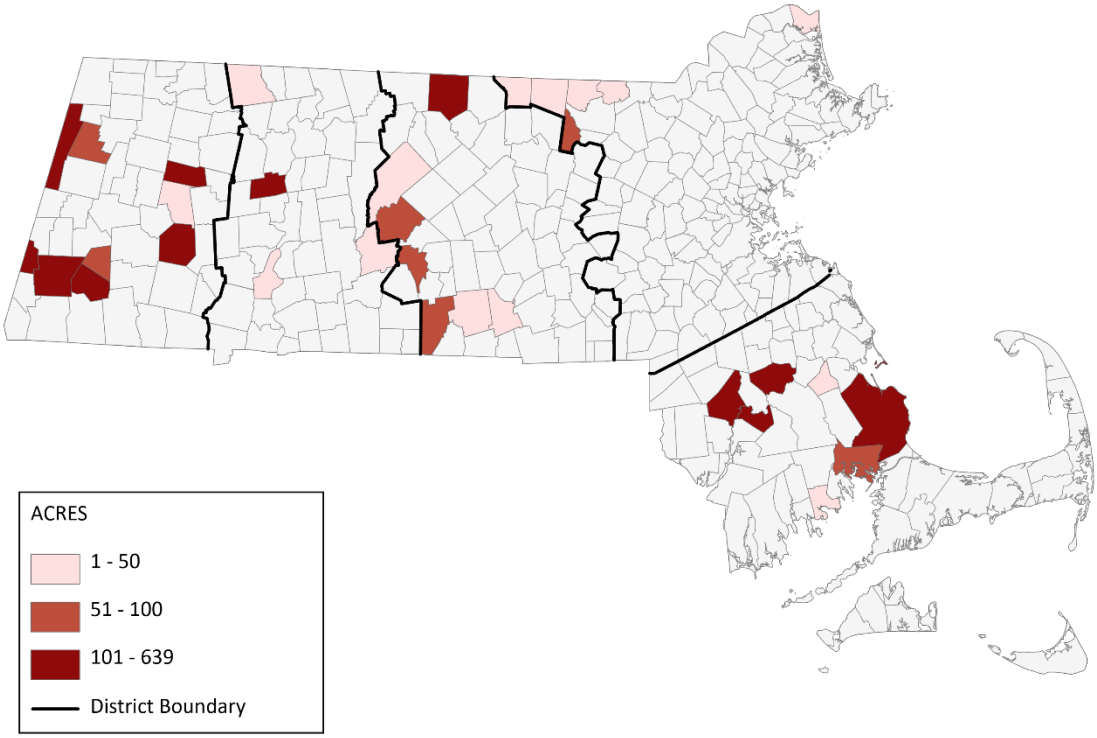


Table DL 1. FY 2023 Summary of Land Acquisitions

Town(s)	Facility	District	Acres
Charlton, Oxford	Little River WMA	Central District	42.00
Hardwick, Ware	Muddy Brook WMA	Central District	99.22
Petersham	Phillipston WMA	Central District	3.34
Sturbridge	Breakneck Brook WMA	Central District	80.00
West Brookfield	Coy Hill WMA	Central District	86.75
Winchendon	Nineteenth Hill WMA	Central District	90.00
Winchendon	Winchendon Springs WMA	Central District	53.68
Colrain	Green River WMA (Valley District)	Connecticut Valley District	35.00
Holyoke	East Mountain WMA	Connecticut Valley District	8.40
Whately	Great Swamp WMA	Connecticut Valley District	16.70
Whately	Mt. Esther WMA	Connecticut Valley District	121.69
Whately	Mt. Esther WMA	Connecticut Valley District	13.54
Ashby	Ashby WMA	Northeast District	4.00
Ashby	Ashby WCE	Northeast District	15.00
Pepperell, Dunstable	Unkety Brook WMA	Northeast District	4.30
Salisbury	Salisbury Salt Marsh WMA	Northeast District	7.00
Salisbury	Salisbury Salt Marsh WMA	Northeast District	15.78
Shirley	Mulpus Brook WMA	Northeast District	55.15

Townsend	Squannacook River WMA	Northeast District	8.50
Bridgewater	Hockomock Swamp WMA	Southeast District	196.00
Mattapoisett	Haskell Swamp WMA	Southeast District	6.00
Plymouth	SE Pine Barrens WCE	Southeast District	33.04
Plymouth	Maple Springs WCE	Southeast District	0.00
Plymouth	SE Pine Barrens WMA	Southeast District	359.75
Plymouth	Halfway Pond WMA	Southeast District	245.27
Plympton	Winnetuxet River WMA	Southeast District	44.10
Taunton	Puddingstone WMA	Southeast District	158.70
Wareham	Maple Springs WMA	Southeast District	83.77
Alford, Great Barrington	Tom Ball Mountain WCE	Western District	224.53
Chester	Walnut Hill WMA	Western District	128.00
Cummington	Cummington WMA	Western District	124.77
Cummington	Cummington WMA	Western District	2.06
Hancock	Misery Mountain WMA	Western District	69.45
Hancock	Brodie Mountain WMA	Western District	145.94
Lanesborough	Barton's Ledge WMA	Western District	58.00
Monterey	Steadman Pond WCE	Western District	193.68
Monterey	Steadman Pond WCE	Western District	262.54
Tyringham	Steadman Pond WCE	Western District	81.24
Worthington	Fox Den WMA	Western District	10.29
			3,187.18

Land Acquisition Highlights

The Northeast District protected 101 acres on 7 projects and managed to acquire some key parcels. Six acquisitions within 7 communities were in fee and one was a Conservation Restriction. One of the projects was a gift, and many involved partners like Essex County Greenbelt and North County Land Trust (NCLT). One of the highlights in the Northeast District during FY 2023 was the protection of the 186-acre South Peak of Mt. Watatic in Ashby and Ashburnham (see the article in No. 4 2022 issue of *Massachusetts Wildlife* magazine). NCLT pre-acquired that land while some old buildings were removed. They retained an additional 15 acres at the end of Hardy Road and have now granted a Conservation Restriction over that land to DGF, thereby permanently protecting that land as well. We hope to work with NCLT in the future to provide environmental education opportunities on these abutting properties. The second highlight was the permanent protection of over 55 acres in Shirley, added to the Mulpus Brook WMA. This large parcel with no road frontage was considered a "Core Parcel" that we have been trying to protect for over 15 years. Another highlight was the protection of two small parcels that were essentially in-holdings; 4 acres in Ashby on the NH border and 2 parcels totaling 8.5 acres in Townsend, surrounded by the Squannacook River WMA.

In the Southeast District, several significant and important properties were acquired in FY 2023. Continuing our commitment to protecting globally rare pine barrens habitat in southeastern Massachusetts, we successfully protected of over 600 additional acres of habitat in the Southeast pine barrens ecosystem through the "Frogfoot" addition to our SE Pine Barrens WMA and the "Halfway Pond West" addition to our Halfway Pond WMA. These two properties abut thousands of acres of protected lands and are home to many species in greatest need for conservation. Another very significant

acquisition represents a brand new Wildlife Management Area in the City of Taunton, the 158-acre Puddingstone WMA, that consists of beautiful mixed upland forest interspersed with wetlands and, as the name indicates, some very impressive glacial erratics. Further, this property is in very close proximity to an Environmental Justice community and will provide an excellent opportunity for passive outdoor recreation to its residents. The final highlight is a relatively small property in terms of acreage, but one that is very significant in terms of conservation of rare species. The new, 41-acre Winnetuxet River WMA in Plympton, a beautiful mix of uplands and wetlands with over 700 feet of frontage on the Winnetuxet River, will protect an extremely rare variant of a state-listed species while at the same time providing excellent outdoor recreational opportunities.

The Central District proposed several parcels for possible acquisition in FY 2023, and the committee approved and provided funding for seven purchases totaling 440.47 acres. The largest of these parcels was the 99.22-acre former "Music Camp" property on Turkey Street in Hardwick. This property required extensive demolition of the old camp buildings and clean-up of the grounds. This work was completed pre-acquisition by the East Quabbin Land Trust. We partner with numerous local land trusts throughout the District (as do other districts), to help broker and facilitate land acquisitions and we are grateful for the conservation opportunities these partnerships bring to the agency.

A total of five land projects were completed throughout the Connecticut River Valley District this year, resulting in 195.45 acres of land protected. Several of the new acquisitions were focused in and around the Mt. Ester WMA in Whately, adding over 135 acres to the state-owned lands there. This WMA is dominated by mixed hardwood forest and contains several vernal pools inhabited by state listed rare species. The newest acquisition here not only protects these habitats but also establishes much need roadside access along Dickinson Hill Road for users to access the property. Another noteworthy new parcel acquired is along the Green River on the Green River WMA in Colrain. This WMA is a popular coldwater fishing destination, and this new acquisition permanently protects another 0.5 miles of river frontage for future generations to fish and enjoy.

The Western District was able to complete ten acquisition projects to conserve more than 1,300 acres in FY 2023. The projects included several highly strategic parcels abutting existing WMAs. We protected a small inholding at the Fox Den WMA, which if developed would have had substantial impact on access and hunting. Projects in Cummington and Lanesborough protected ecologically important lands rich in rare species and habitat types. Both projects also provide excellent opportunity for hunters and other outdoor recreationists. Two of the FY 2023 projects protected hundreds of acres of high elevation forested habitats in Chester and Hancock that will be an important element of climate resiliency in the state. The District continued its partnership with Berkshire Natural Resources Council (BNRC) at the Tom Ball Mountain Wildlife Conservation Easement by adding more than 200 acres of conservation easement land, which improves access and expands on land available for wildlife-based recreation. The largest and most complex project in FY 2023 was a multi-parcel project that included BNRC, the Department of Conservation and Recreation and other partners. MassWildlife's contribution to the project in FY 2023 included the acquisition of more than 500 acres under a conservation easement. The protection of these parcels connects more than 14,000 acres of contiguous conservation lands across multiple towns and is an excellent example of landscape-scale conservation.

Northeast Wildlife District

Administration

The Northeast District was pleased to add Ryan Meuse to the Wildlife Technician crew, taking Joshua Gahagan's place when he moved into the Wildlife Technician III position. Ryan's equipment and vehicle diagnostic and repair skills were a welcome addition as tractors and equipment age and require more maintenance. It was also beneficial to add another witty person to the staff. Ryan was joined by Wildlife Technicians Josh Gahagan and Derek McDermott, Clerk Leslie Gabrilska, Stewardship Biologist Travis Drudi, Fisheries Biologist John Sheedy, Wildlife Biologist Chalis Bird, Land Agent Anne Gagnon, and District Manager Patricia Huckery.

Overall, everyone stayed healthy, with no work-related injuries to report. COVID-19 struck a few District staff and their families, with no apparent long-term effects. Staff remained self-reliant and resourceful in completing project priorities, inserting R3 and relevancy into daily work.

A highlight of the year was the R3 Summit, where Fisheries and Wildlife Board members, MassWildlife staff, and sportswomen and -men gathered to discuss and plan for the future of hunting, fishing, and shooting sports in Massachusetts. Emphasis on exploring barriers and opportunities was particularly valuable to Northeast District staff participating in yearlong R3 groups addressing hunting access, range access, and messaging. Another effort worth highlighting is District participation in the Massachusetts Permitting Group, in its second year, working to streamline permitting for nature-based salt marsh restoration projects that include runnels, ditch remediation, and Saltmarsh Sparrow nesting platforms.

District staff attended seminars and trainings, including required trainings for state employees and on the new Federal Aid database, new inventory tracking, LART, the Northeast Climate Adaptation Science Center (NE CASC) The Status of Tribes and Climate Change Report, NE CASC Gulf of Maine Coastal Research, NE CASC Buying Time with Runnels: A Climate Adaptation Tool for Salt Marshes, NE CASC Localizing Forest Adaptation Strategies to Diverse Northeastern Forest Ecosystems and Threats, NE CASC Understanding Brook Trout Persistence in Warming Streams, NE CASC Identifying Trade-offs and Opportunities for Forest Carbon and Wildlife Using a Climate Change Adaptation Lens, “Degrowth and the Green New Deal,” Deer Aging Class, and Spotted Lanternfly.

Meetings included Fisheries and Wildlife Board business and governance meetings, DCR Stewardship Council, Senior Staff, District Manager, Northeast District and Wildlife Section staff meetings, MassWildlife R3 Kick-Off and R3 group meetings, iNaturalist relevancy, quarterly Salt Marsh Working Group, Coastal Waterbird Cooperators, Human Resources, Great Marsh Coalition, MassFishHunt, Stream Survey collaboration, Hunters Share the Harvest, Drones, Lands Committee, Mt. Watatic Advisory Committee meetings, the Nashua, Squannacook, and Nissitissit Rivers Wild and Scenic Stewardship Council, Field Trials, The Wildlife Society, Federal Taking, National Coastal Resiliency Fund grant, and weekly State Hazard Mitigation and Climate Adaptation Plan grant updates. Quarterly Lands Committee meetings were attended by the District Manager. Telework agreements were updated.

Stewardship, capital, and ARPA fund requests were provided. The Town of Ayer was contacted inquiring about a possible future septic system hook-up. District office capital projects were evaluated. A collapsed silver mine at Martin Burns WMA was evaluated for depth, width, possible equipment access point.

Land acquisition and conservation restriction projects were reviewed in Townsend, Ashby, Shirley, Groton, Newbury, Peabody, and Pepperell. The Northeast District Wildlife Biologist and Stewardship Biologist conducted habitat assessments for some of the proposed parcels.

Stewardship, Management, and Habitat Restoration

Regular stewardship meetings were held between the Stewardship Biologist and District Supervisor, and several informational meetings led by the Stewardship Coordinator.

Vegetation management was conducted at Upper Flint Pond dam maintain the integrity of the dam and fishing access. Two new parking areas were developed for Squannacook River WMA each completed with a gravel lot, signage, gate, and guardrails outlining the parking area. One parking area is an excellent “Watchable Wildlife” location looking over a scenic grassy slope that extends into a wetland and pond complex loaded with birds. Wildlife Technicians developed one new parking area with a gate at Crane Pond WMA. One new gate was installed at another Squannacook WMA parcel.

MassWildlife was joined by volunteers from North County Land Trust and Back Country Hunters and Anglers for a springtime clean-up at Ashby WMA off Watatic Mountain Road. Several truckloads of tires, metal, and trash were removed. District staff would need to return later for an old slide-in camper and boat that were too large to fit in a truck. Staff removed tires, metal, and trash from Squannacook River WMA in the Adam’s Pit and Turnpike Road areas.

A major encroachment at the Nissitissit River WMA was resolved. New ATV issues were resolved at the Squannacook River WMA and Mulpus Brook WMA, with assistance from the Massachusetts Environmental Police and local police. A large trespass from 2010 in Pepperell was resolved. A section of a pole barn was removed, as well as part of a small hayshed. Per court order, the next step is to fence the boundary line. The Comley trespass, land, and habitat damage case, which MassWildlife won, was appealed.

Just under 10 miles of boundary work was completed in-house between Mulpus Brook, Squannacook River, Hunting Hill, and Unkety Brook WMA's. The following WMAs are complete with all new WMA signs: Ashby, Delaney, Elbow Meadow, Martin Burns, Nashua River Access', Nissitissit River, Townsend Hill, Trapfall, Unkety Brook, and Whittier WMAs.

The Ash Street survey at Crane Pond WMA was reposted for West Newbury. This survey is key to resolving several federal taking contested parcels. In-depth research and field work by a different survey group produced a well-developed draft engineering plan and surveyor's report to support boundary delineation decisions on four parcels. A federal taking progress report was completed, including next steps. Compilation and extensive review of documents regarding the Stanley-Handren federal taking contested parcel began.

A portion of Martin Burns WMA was cut to maintain early successional habitat as well as improve upland game hunter access. Ashby, Salisbury Marsh, Dunstable Brook, and William Forward WMAs were mowed to maintain grassland habitat. A forest habitat project was completed at Unkety Brook WMA in coordination with MassWildlife's habitat section.

MassWildlife's Great Marsh Ecosystem Recovery Project (GMERP) team led a site visit for the Town of Rowley's Conservation Agent. The purpose of the visit was to educate him about pending restoration projects in Rowley salt marshes using ditch remediation, runnels, and Saltmarsh Sparow nesting platforms. Review of salt marsh vegetation and Saltmarsh Sparrow monitoring plans were completed to prepare for permitting. Environmental regulations and permitting performance standards were reviewed and a daft permitting schedule completed. The District Manager coordinated with contractor Jon Regosin on the NCRF grant outreach and education component with MA Audubon Society.

A State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) grant request for $270,000 was awarded for GMERP Phase III. Grant funds were used to complete 3,000 acres of preliminary salt marsh restoration design work using nature-based techniques: ditch remediation, runnels, and nesting platforms. Results were shared with MA Coastal Zone Management, Great Marsh managers, and others. A $795,000 National Coastal Resiliency Fund was awarded to MassWildlife by the National Fish & Wildlife Federation to complete final designs and permitting for 3,278 acres of salt marsh in Great Marsh and remove two tidal restrictions. Tidal restrictions are located at Hay Street in Newbury, and Stage Island Impoundment at Parker River National Wildlife Refuge. Research using the NOAA Climate Tool was completed. Climate risk assessments were finished.

Research and Conservation

Wildlife

Northeast district staff built, maintained, or repaired 9 blinds at Delaney WMA for public use and for the controlled waterfowl hunt which takes place every year during the first several days of the duck season per regulation. However, several of the old and new benches were severely damaged during the winter months and will need to be repaired for FY 2024.

Biological deer check continued in FY 2023 with district staff manning 5 locations. All typical biological data was collected with the addition of COVID active virus sampling for the second year. Hunters showed interest in the sampling and collecting of all data. Many roadkill deer were tagged.

The winter of FY 2023 proved to be difficult regarding wood duck work. Due to the compounded difficulties around purchasing rough-sawn lumber and the lack of ice in the Northeast District, the staff were unable to service or erect the typical number of 100+ wood duck nesting boxes. District staff assisted the state Waterfowl Biologist with annual winter duck banding through trapping and tub launching methods. District Staff assisted the state Waterfowl Biologist with the Park Mallard Survey

which takes place every five years. Staff surveyed 49 sites, counted over 1,250 mallards, 30 black ducks, and over 280 Canada geese; all other waterfowl species seen were tallied and documented.

Northeast District completed the annual woodcock peenting survey for FY 2023 in Haverhill, where for the second year in a row woodcock were heard peenting, which had not been previously heard for 4 consecutive years prior to FY 2022. Staff attempted the annual nightjar survey in Townsend and Shirley but was unable to complete it during the survey period due to continuous rain and wind. Two constant zero ruffed grouse drumming survey routes were up for survey this year, in Newburyport and Lawrence; no drumming was detected during FY 2023 survey, so both routes remain constant zeros.

The black bear research project ran from the beginning of April to mid-June 2023. Multiple research sites were established, barrel traps were set based on bear activity. Three male bears were captured, ear-tagged, and released from a single trap site, no females were captured. Two previously tagged males had been reported in New Hampshire.

Annual goose banding continued through the end of June 2023. District staff, with assistance from FHQ staff captured and banded 251 geese from numerous sited throughout Norfolk, Middlesex, Suffolk, and Essex counties.

Regarding disease, staff collected and transferred to Tufts Wildlife Clinic several ducks, geese, and a raptor suspect of highly pathogenic avian influenza (HPAI) throughout FY 2023.

Fisheries

Stream surveys were conducted in eight watersheds and 26 streams. Staff found native brook trout at several locations. Two stream restorations were completed in the district at Sucker Brook in Pepperell, and Traphole Brook in Walpole/Norwood. Friends of White Pond continued to be interested in trout stocking, algal blooms, and the health of the pond.

Staff investigated Washakum Pond in Framingham as a possible trout stocking location but found access difficult, with “residents only” and “no parking” signs that prevent non-resident’s use of the resource. One fish kill of about six fish was reported from a no-name stream impacted by an explosion in Newburyport.

Natural Heritage and Endangered Species

Significantly important turtle nesting areas at the Upper Parker River WMA in Groveland were maintained as well as in the Squannacook Meadows area owned by the Town of Townsend (adjacent to Squannacook River WMA). Volunteers from both towns assisted with removal of encroaching vegetation. Staff from the District and the Natural Heritage & Endangered Species Program responded to a call for help from turtle volunteers who have protected turtle nests at Squannacook Meadows for over 15 years. Blistering hot weather did not deter workers who dropped flagged shrubs and saplings shading the nesting area, dragging the cuttings to a central collection for pick-up. Turtle nesting areas were checked at Townsend Hill WMA, The Throne Conservation Restriction area, and two other locations at Squannacook River WMA.

Staff attended an interagency and conservation partner meeting led by USFWS to discuss Saltmarsh Sparrow monitoring protocols for landscape-level salt marsh restoration projects. Different protocols were discussed that focused on creating an efficient and scientifically meaningful collection of data.

Bald eagle surveys were conducted in April 2023 in cooperation with volunteers who were able to track week-to-week development of the chicks. District staff are tracking 29 nests. Eagle chicks were banded in Amesbury and Haverhill. Several eagles were transferred to Tufts Wildlife Clinic for rehabilitation or necropsy from injuries or suspected rodenticide poisoning. One bald eagle from Dedham died from a feather follicle gone awry inside the body.

Enhancement of Outdoor Recreation

The Northeast District stocked about 5,000 pheasants on 5 WMAs, 3 privately owned hunter-accessible properties, 2 DCR-owned properties, and 1 town-owned property. The WMAs stocked with pheasant include Martin Burns, Crane Pond, William Forward, Ashby, and multiple parcels of Squannacook. Two youth pheasant hunts were held in Walpole and Newbury (Kent’s Island). The Northeast District lost two more pheasant-stocked private covers during FY 2023 but added one to a newly acquired parcel at Squannacook WMA. The District has received several positive comments from

hunters regarding this addition due to ideal hunter access, grassland management, and pheasant cover. District staff continue to increase our ability to maintain grasslands and early successional habitat through reclamation at Martin Burns, Ashby, Townsend and Squannacook WMAs; feedback has been positive.

There were over 90,000 trout stocked in the Northeast District. No major stocking truck issues occurred. Cherry Brook in Weston was dropped from the trout stocking list. The angler trail to the Merrimac River was maintained at Salisbury Salt Marsh WMA where striped bass are often caught. Several questions from the public about pond access were investigated.

Over 500 target range permits at Martin Burns WMA were issued. Four clubs were allotted field trial permits for Delaney WMA, as well as one mock fox hunt. A mock fox hunt at Surrendon Farms WCE in Groton was approved. Eleven waterfowl blinds were maintained at Delaney WMA, and the controlled hunt application was updated. One hunter took part in the paraplegic hunt held at Fort Devens, where deer were seen. Staff assisted Essex County Greenbelt Association with hunting signage.

District help was provided at the family fishing clinics held at Brookline Reservoir and Lake Cochituate.

Outreach and Education

The District Manager contributed to a Bird Observer article about salt marsh restoration projects for Saltmarsh Sparrows in Great Marsh. The article included a discussion of a novel nesting island technique that was added to large-scale nature-based restoration projects to act as rescue habitat.

National Park Service staff from the Wild & Scenic River Program toured the proposed oak woodland project area with MassWildlife staff from the habitat section, District and Field Headquarters. MassWildlife staff provided an overview of the project, answered questions, and accepted advice.

Massachusetts Fishing and Hunting guides were distributed to vendors, the Department of Conservation and Recreation, and the Division of Marine Fisheries. Pepperell Cub Scouts were educated about Living with Wildlife. A land event was held at the new South Peak of Mt. Watatic parcel added to Ashby WMA where MassWildlife literature was handed out and refreshments were enjoyed.

Technical Assistance

There were numerous wildlife calls regarding general questions, sightings, and conflicts. A call came in from Mass Audubon Society regarding a goose in distress. Staff helped Mass Audubon with the problem and ended up banding geese at the property after educating its staff about the procedure and reason for banding. The goose was rehabbed and released at Broadmoor Wildlife Sanctuary. Several calls on coyotes with mange were handled. Many calls were received from the town of Peabody on all manner of wildlife concerns and questions. Coyotes topped the inquiry list, followed by black bear. A black bear in Townsend and Pepperell killed several goats. The owners were advised about precautions to take to avoid losing more goats. There was much interest in dead and dying bald eagles for which staff communicated lab test results. Calls about problem coyotes in Nahant were fielded.

The Town of Concord Deer Committee requested assistance from staff regarding educational materials, hunting safety, and hunting messaging. Westborough Field Staff then followed-up with in-depth technical assistance.

In coordination with NHESP, meetings were attended with West Newbury town officials regarding Ash Street in Crane Pond WMA, where many animals are road-killed. Options were discussed to reduce traffic speed. Living with Bear factsheets were distributed in Middleton as part of a LART call. Staff went house-to-house in the neighborhoods where the black bear was seen.

Help was provided with the MassFishHunt license sale system. Wildlife rehabilitator and animal control agent tests were administered. Staff helped people with questions about baby birds, air guns, use of temporary blinds on WMAs, trails, downed woody material, hazard trees, training dogs, monarch butterflies, loon rescue, and many other wildlife questions.

Southeast Wildlife District

Administration

There were no personnel changes in the Southeast District in FY 2023. There were a number of important and/or exciting administrative projects and issues in the District this fiscal year. Primary among those was the District's involvement in the successful application for an America the Beautiful (ATBC) grant that provided funding for a landscape level conservation project in the pine barrens ecosystem in Southeastern Massachusetts. The centerpiece of the project is the restoration of the former cranberry bog complex, widely known as Century Bog, at our Red Brook Wildlife Management Area. District staff also coordinated with the National Wild Turkey Federation and the Camp Edwards Natural Resources Program to begin planning for a future ATBC grant application to enhance habitats on the base and surrounding landscape for a variety of wildlife species.

A close second in terms of importance and excitement was the successful establishment of a new Hunters Share the Harvest Program at MassWildlife, which originated out of the Southeast District. Several District staff played integral roles in establishing this program and worked with the single approved processing facility and the Massachusetts Military Support Foundation to distribute healthy processed venison to Veterans and their families. Through this initial pilot year of the program, over 1,700 meals of venison were donated.

District staff attended or completed several trainings and certifications in FY 2023 including annual wildfire refresher training and work capacity tests, several other wildfire training courses (L280, etc.) and CPR/First Aid/Stop the Bleed training.

The District Supervisor attended a half day workshop at Cape Wildlife Center along with professionals from the problem animal control industry regarding the use and effects of rodenticides. The District Supervisor also attended annual INRMP meetings and reviewed and provided feedback on plans for Camp Edwards and Cape Cod Space Force Station as required under the SIKES Act.

Stewardship, Management, and Habitat Restoration

Several ongoing land issues continued to be addressed in FY 2023 including reviewing and ultimately not approving a CR amendment request on the Plymouth Town Forest WCE, continuing to work with Eversource and DCAMM on the licensing and approval (including a land swap) for a new substation at Camp Edwards, coordination with the Town of Barnstable and DOT on the future bike path construction at Hyannis Ponds WMA, the review of a request to create a parking area and access path to a historic cemetery at Erwin Wilder WMA and ongoing coordination with Barnstable County Commissioners related to PFAS contamination and cleanup on and adjacent to our Hyannis Ponds WMA that resulted from prior activities at the former Barnstable County Fire Training Academy.

District staff worked closely with the Cape Cod Museum of Natural History to transition away from prior activities and use of the Old Sandwich Game Farm WMA by the prior licensee (Thorton Burgess Society) and begin to develop a new license agreement focused solely on environmental education. The property had a history of inappropriate use by some members of the public, who treated it as a pseudo dog park, which was encouraged by some of the game farm volunteers. All active maintenance and management will now be handled by the District with a focus on wildlife habitat enhancement.

A significant issue on the Frances A. Crane WMA was handled by District staff that involved a major clearing operation conducted by contractors hired by the military to cleanup former grenade ranges that were located on Crane and on the military base to the north. Agency staff had to attend numerous meetings with the military and work to ensure that the methods used and the restoration of the area following cleanup were consistent with our habitat goals for the property and in compliance with MESA. Further, we had to work to install signage and conduct public outreach to inform the public that this portion of the WMA would be closed to public access, including hunting, during the duration of the project. Final restoration, including seeding the area with native grasses, will be completed in Spring 2024.

District staff continued to work with other MassWildlife personnel and the Division of Ecological Restoration on the Mill Brook Bogs restoration project. The project reached final permitting in FY 2023 and is awaiting a few final steps to be able to proceed to construction.

The District Supervisor and Stewardship Biologist worked with DEP and the Town of Middleborough to resolve a significant issue at the Rocky Gutter WMA where Middleboro Gas & Electric had inadvertently left hundreds of feet of timber matting, associated with a prior maintenance project, in wetlands on the WMA. The Town hired Stantec to complete a survey of the site and develop a restoration project. Further, as was identified in the review process, there was a significant issue with illegal dumping and illegal OHV use on the right-of-way due to unimpeded access from Pine Street. District staff requested that a gate and barriers be included in the project and were successful in getting the Town to agree to install them, which should benefit the WMA in the future.

Staff were involved in addressing a significant trespass issue at the Canoe River WMA that included a bridge constructed over the river and extensive miles of illegal dirt bike tracks created on the property. A hunter alerted us to the issue and was able to positively identify the individual that was involved (the man confronted the hunter in the field on his dirt bike and admitted to building the bridge and trails). District staff worked with the Massachusetts Environmental Police, staff from NHESP and the Norton Conservation Commission to have the person cited and the bridge was removed and trails re-naturalized.

Working closely with DFG legal, our land stewardship team and counterparts at DCR, the District worked to review an accessible nature discovery trail proposal by the Trustees at the Copicut Woods WCE, where we co-hold a CR with DCR. The review involved quite a bit of negotiation with the Trustees to ensure the trail proposal was in compliance with the terms and conditions of the CR, as well as appropriate for the property. Additionally, MassWildlife staff worked to ensure to get out ahead of any potential conflicts between the trail and legal hunting on the property by getting the Trustees to agree to close the trail during hunting season if any conflicts materialize. It is expected that MassWildlife and DCR will issue final approval on the project in early FY 2024.

The District Stewardship Biologist completed annual monitoring visits and reports on all 43 District Conservation Restrictions (CRs) that were his responsibility in FY 2023.

Long sections of boundary line were marked/maintained at Haskell Swamp WMA and Camp Cachalot WMA (formerly WCE).

Gates were installed and/or maintained at several properties including 2 gates at the Rocky Gutter WMA, 1 gate at the Mill Brook Bogs WMA and 1 gate at the Frances A. Crane WMA.

Fire breaks were created and/or maintained at a number of Division properties including the Mashpee Pine Barrens WMA, Camp Cachalot WMA, SE Pine Barrens WMA, Hyannis Ponds WMA and Frances A. Crane WMA.

Prescribed fires were conducted at the Frances A. Crane WMA, SE Pine Barrens WMA and Penikese Island Sanctuary. Staff also assisted with numerous prescribed fires in other Districts and also assisted with a prescribed fire on Cuttyhunk Island.

Herbicide applications to treat invasive species were completed at the Burrage Pond WMA, Frances A Crane WMA, Erwin Wilder WMA and Noquochoke WMA.

New composite WMA signs were installed at the Sippican Headwaters WMA, Burrage Pond WMA, Erwin Wilder WMA, Frances A. Crane WMA, Hockomock Swamp WMA, Mashpee Pine Barrens WMA, Old Sandwich Game Farm WMA, Red Brook WMA, Halfway Pond WMA and Hyannis Ponds WMA.

Ongoing wetland restoration and management continued this FY at the Burrage Pond WMA with many hours of District staff time put towards maintenance of water control structures and flooding of 250 acres of former cranberry bog to support emergent wetland habitats for wildlife.

The final phase of the wetland restoration project at the former Dyer property within our Taunton River WMA was completed when staff seeded the entire restoration area with native wetland seed mix from

New England Wetland Plants. Further, about 10 acres of fields were planted to native little bluestem at the Frances A. Crane WMA.

After many years of work and coordination with the USEPA and design and permitting with the local conservation commission, the wetland restoration project at the former Dyer property at the Taunton River WMA was completed. The project involved removing two concrete flumes and replacing them with fixed elevation stone weirs, excavating several sections of former bog dike, grading of the tailwater recovery reservoir and seeding with native wetland plants. District staff oversaw the entirety of the project and completed the wetland plant seeding. The completion of this project closes out a USEPA and Department of Justice enforcement case and will allow the site to revert to natural wetland habitat to benefit wildlife.

Research and Conservation

Wildlife

The most notable wildlife issue in the Southeast District in FY 2023 was the continued expansion of the bear population into the region. Since the famous Cape Cod Bear traveled throughout the Cape and all the way to Provincetown in 2012, the District has seen sporadic bear sightings every few years, but mid to late FY 2023 proved to be the year of the bear in the District. Staff responded to dozens of calls and emails associated with the, at least, three bears roaming the region. Most calls were simply reports of sightings, but we dealt with a wide variety of inquiries ranging from concern for safety of people/pets, property damage (bird feeders mostly), concern for the welfare of the bears and several instances of livestock predation (goats primarily). Thankfully, due to prior experiences with bears, many of the towns in the district handled issues associated with bear sightings appropriately, however some towns with little or no experience required some hand holding to get them to the point where they were responding to bear reports appropriately and disseminating the correct information to the public. All of the bears confirmed in the District in FY 2023 appeared to be 2-3-year-old males.

Southeast District staff completed multiple annual spring surveys including three ruffed grouse drumming surveys (Joint Base Cape Cod, Myles Standish State Forest, Cohasset), one nightjar survey (Mashpee/Falmouth), seven breeding waterfowl plot surveys (Eastham, Barnstable, Chatham, Truro, Falmouth, Wellfleet, Joint Base Cape Cod) and one woodcock peenting surveys (Bridgewater). The annual park mallard survey was also completed throughout the District.

Southeast District personnel assisted the MassWildlife Waterfowl Biologist in pre and post season duck banding efforts during the summer of 2022 and winter of 2023 utilizing tub launcher and drop door trapping techniques, banding a total of 122 mallards and black ducks and recapturing 31 previously banded ducks.

Continuing MassWildlife's involvement in the Black Duck Joint Venture, Southeast Wildlife District utilized baited funnel traps to capture 10 female black ducks in Duxbury, Plymouth, Harwich, and Chatham. Black ducks were banded and affixed with GPS transmitters in a continued effort to research nesting habitat usage and success in the boreal forest.

In early June, District staff banded a total of 149 Canada geese throughout Bristol, Plymouth, and Barnstable counties. Seventy-four bands were deployed in Bristol County (sites in Acushnet, Attleboro, Dighton, Easton, Fall River, North Attleborough, Swansea and Westport), fifty in Barnstable County (sites in Dennis, Harwich, Orleans and Yarmouth) and 75 in Plymouth County (sites in Bridgewater, Brockton, Carver, Duxbury, Marion, Norwell, Plymouth and Rochester).

Staff continued to maintain wood duck nesting boxes and collect data on box usage at 25 boxes spread across 8 sites including Bourne, Falmouth, Lakeville, Mashpee, and Middleboro. Also, as part of an experimental effort, District staff constructed and installed 6 eider nesting structures on Bird, Ram and Penikese Islands, modeled after structures designed as part of a graduate student project.

The District Wildlife Biologist responded to a call from Brockton High School regarding a brood of mallard ducks apparently stranded within their courtyard. He was able to successfully capture the adult hen and all her ducklings and safely transported them outside of the courtyard and released them in a pond next to the school.

New England cottontail trapping continued in the district this year in support of ongoing restoration efforts. A total of 17 rabbits were trapped, which included 15 New England cottontails and 2 eastern cottontails. Four of the NEC were transported to the Queens Zoo, and one went to the Roger Williams Zoo to be part of ongoing captive breeding programs.

Staff responded to white-tailed deer fawn calls in Carver and Mansfield. The Carver fawn was determined to be orphaned as the doe was hit by a car and that one was transferred to a permitted fawn rehabber. The second one was determined to be severely injured and was humanely euthanized.

District staff operated biological deer check stations this FY at locations throughout the District including Cape Cod and the islands. Important biological data (age, sex, etc.) and other samples were collected (COVID testing, etc.) from hundreds of deer. The data collected is critical to modeling and management of the deer populations.

The outbreak of highly pathogenic avian influenza in the bird populations in the US continued to be an issue in the District and staff responded to numerous calls regarding sick and dead birds and collected many to take for sampling. Staff also collected routine surveillance samples during waterfowl banding.

Fisheries

The Fisheries Biologist continued ongoing monitoring and maintenance of the White Island Pond dam and fish ladder this FY. Routine visits were made to the site to adjust boards and conduct instream manipulations to ensure fish passage during spring and fall migrations. Vandalism to the fish ladder that blocked fish ladder flow and fish passage during the peak herring up migration was corrected in May 2023.

A long-term stream temperature monitoring network was maintained on 21 coastal streams and data collected and imported into a stream temperature database. Data has been provided to other researchers on request and has been used to evaluate the success of the Childs River restoration project.

Stream surveys were conducted in consultation with the Fisheries Section in Westborough on Leonard Washburn Brook in Lakeville, an unnamed tributary to Fuller Brook in Middleborough, Quashnet River in Falmouth/Mashpee, the inlet to Hinckley's Pond in Harwich, Town River in Bridgewater/West Bridgewater, Bound Brook in Cohasset, Mill River in Taunton, unnamed tributary to Taunton River in Raynham, unnamed tributary to Three Mile River in Taunton, Basset Brook in Duxbury, Phillip's Brook in Duxbury, Boiling Springs Brook in Westport, Pierce Brook in Westport, unnamed tributary to Allens Pond in Dartmouth/Westport, Mouse Mill Brook (Hemlock Gutter) in Westport, Abbot Run in North Attleborough, Huldah Brook in Pembroke and McFarland Brook in Pembroke.

As part of ongoing research and monitoring of wild salter brook trout populations, Passive Integrated Transponder (PIT) antennae were monitored and maintained at Red Brook, Quashnet River, Childs River, Coonamesset River and Third Herring Brook and additional surveys and tagging were completed. Spring sampling of young-of-the-year brook trout was conducted in restored reaches of the Childs and Coonamesset Rivers confirming brook trout reproduction and highlighting some of the benefits of ecosystem restoration in former cranberry bogs.

The district continued our excellent relationship with the Sandwich Fish Hatchery. We assisted with a variety of day-to-day projects, helping to unload feed truck deliveries, inventories of trout, relocation of trout to other raceways and assisting with fall trout spawning.

The Fisheries Biologist assisted with the one-year post construction report on the Childs River restoration project, providing data and editing the report completed by the Association to Preserve Cape Cod.

Natural fish kills were reported in Bucks Pond in Harwich, Mares Pond in Falmouth and Lovells Pond in Barnstable, and a fish kill due to a disease outbreak was investigated at Oldham Pond in Pembroke in May 2023. Bait dumping was reported in the Nemasket River in February 23, 2023. Several fish kills reported in saltwater areas were reported to the Division of Marine Fisheries. A large kill of freshwater mussels was investigated in Halfway Pond in Plymouth in August 2022 and a potential kill of mussels was reported to Westboro staff after the breach of a cranberry bog dam near Robbins Pond on January 27, 2023.

Natural Heritage and Endangered Species Program

The district cooperated with the Natural Heritage and Endangered Species Program (NHESP) staff on a variety of projects this fiscal year. The most significant NHESP project that is supported by District staff is our coastal waterbird programs including the Buzzards Bay tern project, piping plover monitoring and management and coastal waterboard monitoring and surveys.

Staff completed annual surveys for piping plovers, terns and American oystercatcher nesting surveys on a total of 18 sites including 9 on the Elizabeth Islands, 8 in Nasketucket Bay and one in Matapoisett. Data from these surveys was entered into an online master database that helps the agency keep track of these species populations. Routine monitoring visits were conducted at several piping plover nesting beaches to ensure compliance with the State and Federal guidelines/regulations.

The District Supervisor was involved in handling a particularly sensitive and controversial piping plover issue at Duxbury Beach this FY associated with concerns about predator control completed by USDA APHIS on behalf of the Duxbury Beach Reservation.

As has been the case for many years, staff assisted with a wide variety of tasks associated with the Buzzards Bay tern project including storing, maintaining and transporting boats, brushcutting, placement and pickup of nesting structures and bird productivity surveys. The District also provides housing for seasonal tern project staff at our Red Brook WMA house.

Additionally, the District Supervisor coordinated with tern project staff, the Office of Fishing & Boating Access, the Penikese Island School and MassWildlife fiscal program staff to evaluate options and plan for repairs to the docking pier at Penikese Island, something that is critical to both the tern project and MassWildlife's habitat management projects on the island.

In an effort to better protect and build awareness of sensitive coastal plain pond resources at the Plymouth Town Forest WCE, the District worked closely with O&E staff to develop a new coastal plain pond informational sign to be installed at several locations on the property. It is anticipated that this sign template can and will be adapted to other properties where CPP resources exist.

Staff continued our ongoing work associated with the recovery of the American bald eagle in Massachusetts by monitoring all of our known/active nests and completing chick banding at a few select nests, mostly as events to raise awareness to the successful recovery of the species. District staff banded eagle chicks in a nest on the Bristol County Agricultural High School campus as part of an endangered species day event that included staff/students from the school, the Commissioner of the Department of Fish and Game, several politicians and other dignitaries. Checks were also banded at a nests in Lakeville, Plymouth and Wareham. The Wareham location involved a partnership with Eversource, who again provided a bucket truck and operator to help get staff to the nest which is located on an old osprey nesting pole in their ROW. District staff also assisted as climbers at banding events at nests in Shrewsbury, Grafton and West Brookfield. A total of 13 active nests were monitored in the District in FY 2023, 10 of which were successful and fledged a total of 17 healthy eaglets.

The District also participated in the annual Spring Bald Eagle Survey.

District staff assisted with a variety of other rare species surveys and projects this FY including rare plant surveys (ex: Agalinis at Frances A Crane WMA), rare turtle research and monitoring and rare invertebrate surveys.

Enhancement of Outdoor Recreation

District staff successfully stocked our fall 2022 allocation of 11,600 trout into 24 ponds. Our spring 2023 allocation of over 93,000 trout was stocked out into 51 ponds and 13 streams.

The staff provided birds for another safe and successful upland game bird hunting season, stocking 7,936 pheasants on six WMAs and over 12 open covers throughout the district. WMAs stocked with pheasant include Erwin Wilder, Frances A. Crane, Freetown State Forest, Marconi (CCNS), Myles Standish State Forest, Hockomock Swamp and Noquochoke. Open local covers include Sandy Neck Beach and Town Conservation Land off Popple Bottom Road in Barnstable, Crowes Pasture Conservation Area in Dennis, Scusset Beach State Park, South Cape Beach State Park, the Shawme Fish

and Game Club grounds, the Falmouth Rod and Gun Club grounds, private agricultural land off River Street in Halifax and Middleboro, private agricultural land off Cedar Street and North Central Street in East Bridgewater, and two other portions of the CCNS, near the Provincetown Airport and the eastern edge of Griffin Island in Wellfleet. Also, Waskosim's Rock Reservation, Sepiessa Point Reservation, Manuel Correllus State Forest and Katama Farm are stocked on Martha's Vineyard and 8 locations are stocked on Nantucket.

In addition to pheasants, staff also stocked 3,500 Bobwhite Quail, split evenly between the Frances A. Crane WMA and Myles Standish State Forest WMA. Eight-week-old pheasants were again delivered to the Samoset Rod and Gun Club and the Shawme Fish and Game Club as part of the DFW's Club Bird Program. The District also provided pheasants to the Carver Sportsmen's Club and the Falmouth Rod and Gun Club for use in the DFW's Young Adult Pheasant Hunt.

The District operated and managed safe and successful controlled-access hunting opportunities for white-tailed deer and wild turkey at Camp Edwards on Joint Base Cape Cod. These efforts provided hundreds of sportsmen with the opportunity to hunt on roughly 9,500 acres of open territory on the base and resulted in the harvest of 71 deer and 18 turkeys. Between all the controlled hunting programs this fiscal year, a total of 986 days of hunting recreation were provided.

The District once again cooperated with the Trustees to help manage the controlled deer hunting program at the World's End Reservation in Hingham.

The District Supervisor issued permits for a total of 39 special winter game bird hunts, 2 at the Erwin Wilder WMA and 37 at the Frances A. Crane WMA. Seven field dog trials and/or training days were reviewed and permitted by the District Supervisor at the Frances A. Crane WMA. Further, eight individual dog training permits for using captive-reared mallards were issued to interested sporting dog owners/trainers.

Capital stewardship funding was again utilized to create, maintain, and improve recreational access to our lands this FY. A new parking lot and access road was constructed at the Mill Brook Bogs WMA. Additionally, parking lots were maintained/improved by adding gravel and regrading at the Erwin Wilder WMA, Rocky Gutter WMA, West Meadows WMA, Haskell Swamp WMA, Frances A. Crane WMA and at the Tispaquin Pond Access.

District staff mowed and maintained the open field habitats and access trails on all of our public pheasant and quail stocking covers. Specialized mowing was also completed at our Frances A. Crane WMA and the Hockomock Swamp WMA in support of permitted sporting dog training activities.

District staff safely and successfully distributed our annual Guide to Hunting, Fishing and Trapping to all license vendor locations in the District, as well as to many other locations (visitor centers, DCR facilities, Town Police Departments, sporting goods stores, etc.).

District staff routinely re-installed dog regulation signs on all of the typical properties where we see issues with compliance with the regulation by dog walkers and tend to have conflicts with other lawful outdoor recreational use of our lands. Further, we worked closely with the Massachusetts Environmental Police to continue to educate the public regarding the regulation and, where necessary and appropriate, push for citations to be issued.

Outreach and Education

District personnel continued to provide information and educate the general public, as well as a wide variety of other agencies and organizations, through publications and presentations and by attending meetings and events throughout the region.

Southeast District personnel prepared and staffed displays at the Marshfield Fair, the Boston Bowhunters annual BBQ event, the Betty's Neck 20th Anniversary Celebration and several environmental career days and youth events. Staff also attended, manned a display booth and sold hunting and fishing licenses at the Standish Sportsman Show.

Staff from the Southeast District organized and operated a display and several workshops at the first annual Huntstock Event at Wildwood Farm in Westminster. Staff attended the event and had displays on deer biology and management, hunter education and general MassWildlife information. We also had our dermestid beetle colony on display and gave people information on how to maintain their

own beetle colony to do European mounts. Staff also gave a demonstration on rendering bear fat into grease for cooking and led, in cooperation with Brookline Cutting Barn, a full demonstration on field dressing, skinning and butchering a deer.

Several District staff were heavily engaged in a variety of R3 project teams including Go Fish MA, Finding Common Ground, Hunters Share the Harvest, Acceptance of Hunting Fishing & Shooting Sports, Access and Opportunity, Coordination & Partnerships, Learning Resources and R3 Skills and several others. As part of one of these R3 Projects, staff organized and executed a cleanup event at the Southeastern Massachusetts Bioreserve working with many different partnering organizations.

Staff contributed to the creation of a number of web-based educational materials as well as live/virtual hunting skills classes and workshops. Specifically, staff provided recipes, photos and information in support of materials created to help people learn to properly handle and cook a variety of game species and staff taught sections of several learn to scout online classes. Several district staff helped set up the District HQ to host two hunter educational field days at the office and all of the same people taught or assisted in teaching a variety of the round robin skills-based sections of the field days. A few staff also traveled to the Westborough Field HQ to teach in other hunter education field days.

District staff participated in and helped coordinate public informational site walks associated with our habitat improvement projects at Mashpee Pine Barrens and Frances A. Crane WMAs.

District staff gave presentations on a variety of topics this year including a coyote life history/living with coyotes talk in Dennis, a presentation on Quashnet River Brook Trout Restoration and Research and a presentation on research in the Waquoit Bay National Estuarine Research Reserve, among others.

Staff also spoke and gave an eagle banding demonstration at an Environmental Species event at the Bristol County Agricultural School.

The District Supervisor attended an event at On the Water and spoke on fisheries management, angler education and fisheries regulations to a group of fishing industry professionals from throughout the northeast.

The National Archery in the Schools kit was delivered to the Old Colony Regional School and the Monomoy High School for their use in running the curriculum through their physical education programs. Further, the District Supervisor supported the NASP program by helping instruct at the Governor Winslow Elementary School.

The District Fisheries Biologist participated in the Earth Day Trout Stocking Event, stocking fish at Little and Long Ponds in Plymouth and giving a brief presentation on trout stocking and fisheries management to the public in attendance.

The Fisheries Biologist also attended regular meetings of the River Herring Network, Eastern Brook Trout Joint Venture and Sea Run Brook Trout Coalition.

Staff supported the Angler Education program helping to organize and run three urban angler education events in the District.

The District Supervisor attended virtual and in-person monthly meetings of the Barnstable, Bristol, and Plymouth County leagues of sportsmen, providing them with information on MassWildlife activities and answering fish and wildlife questions.

Technical Assistance

District staff provided technical advice and support to many local Animal Control Officers, police departments, boards of health, and conservation commissions, as well as to the MEP on issues dealing with fish, wildlife, and their habitats. Many of these issues relate to the review of the potential impacts of proposed development projects on fish and wildlife. Others dealt with suburban wildlife and conflicts with humans and with other public health and safety concerns related to fish and wildlife, particularly nuisance or damage complaints and reports of sick or injured wildlife. The district responded to a variety of problem animal calls this fiscal year, predominantly dealing with coyotes, aggressive wild turkeys and aggressive hawks. Further, as stated previously, a great amount of time and effort was put into helping cities and towns in the district learn how to live with black bears given the continued expansion of the population and rapid increase in bear sightings in the district.

Aggressive hawks once again were a hot topic in the District this FY. The District Biologist, with assistance from other staff, responded to 5 different aggressive hawk calls where a site visit and some further action was needed due to the severity of the situation. In some cases, it involves climbing to the nest and removing chicks (that are then fostered into another nest) and cutting out a limb or two to prevent renesting in the future. Other times, we simply advise a little more tolerance, especially when chicks are very close to fledging, and then return once they have fledged to modify the tree in an attempt to prevent renesting.

On a day when there was no staff available from the NE District as they were tied up with other important projects, two staff from the Southeast responded to a DCR facility in Everett and captured a hawk stuck in an abandoned structure and released it unharmed outside.

Staff responded to dozens of calls regarding nuisance and/or aggressive turkeys this year. Many calls are handled simply with education and technical advice, but site visits and responses were necessary at sites in Attleboro, Dartmouth and Halifax and two severely aggressive turkeys were removed and euthanized.

After what seemed to be a few down years in problem coyote calls, District staff saw a significant increase in coyote calls this year. Staff handled repeated calls from Eastham, Falmouth, Hingham, Hyannis, Taunton, and Yarmouth. Many of these situations revolved around intentional or unintentional feeding of coyotes by people. Further, towards the end of the fiscal year we began to field a huge number of calls and emails regarding a coyote with mange in that frequented some neighborhoods in Plymouth. Staff conducted multiple site visits and determined that the animal could move and feed perfectly fine and educated people to allow nature to take its course and that there was a real possibility that the animal could recover from mange and survive.

The District Supervisor and Fisheries Biologist were heavily engaged in providing technical advice and support to residents in the Town of Mashpee who were concerned about losing access to Santuit Pond due to an outboard motor ban being proposed by the Town. Through our efforts we were able to maintain outboard motors, however horsepower and speed restrictions were placed on the pond.

Another access issue that the District provided support to had to do with waterfowl hunting access to Shallow Pond in Barnstable. Apparently a few neighbors filed a complaint/petition with the Town regarding duck hunters on the pond allegedly shooting too close to their homes. The Town had illegally posted no hunting signs on the pond after receiving the petition, even though the Pond is a Great Pond and hunting is protected by statute. The District Supervisor met with the Town and worked out an educational plan and associated signage to be installed at the pond access points to remind all hunters of the setback requirements and other hunting safety tenants such as determining safe zones of fire, etc.

District staff cooperated with the Town of Pembroke and a private resident to help address a problem beaver situation, where beavers had gotten into a piece of Town conservation land that was a small former cranberry farm. Their dam had raised water levels to the point where the private individual's property was getting flooded and the owner had concerns about their home and septic system. District staff conducted multiple site visits, attended conservation commission and selectmen meetings, and provided technical assistance in guiding the town through the Massachusetts beaver laws.

Staff continued to field a lot of calls regarding ospreys nesting on people's homes, boats, etc., this fiscal year. Staff worked with O&E and our ornithologist to develop a comprehensive new section of the website dedicated specifically to addressing ospreys' nests in problematic places. Fortunately, staff have formed a very good relationship with USDA APHIS Wildlife Services staff, the USFWS Migratory Bord Permit Office, and several experienced PAC agents in the District, allowing us to quickly and efficiently find homeowners the information and resources they need to find a timely solution to this issue.

We started to see an increase in nuisance deer calls this year, particularly from farmers and landowners in southern Bristol County, which we believe is in part due to a couple of newly formed organizations in that area; The Herd and SEMAP. As is the case with most of these calls, we provide all the information, technical advice, and options available

to them to help address the issue, including fencing, opening their property to more hunting, repellents, and MGL Chapter 131, Section 37. A total of 5 Section 37 informational letters were issued to farmers/ and landowners in FY 2023.

The District had staff that served as the MassWildlife representative on a variety of management teams and efforts, including the Santuit Pond Preserve Management Team, the Assawompset Pond Complex Management Team, the Lyman Reserve/Red Brook Management Team, the Wildlands Trust Stewardship Committee, the Cape Cod Pond Strategies Technical Advisory Committee, the Buzzards Bay Restoration Committee, the Southeastern Massachusetts Bioreserve Management Team and the Mashpee National Wildlife Refuge Management Team. The activities as a member of the Plume Containment Team and served on the Buzzards Bay Restoration Committee.

Central Wildlife District

Administration

Central District staffing was stable through FY 2023 with no changes in personnel. Our newest addition in the district, Aquatic Biologist Dr. Rebecca Colby, completed her first full year and has proven to be a valuable complement to the team. Overall, district staff have great depth of experience, with an average length of service of nearly 14 years and a few people approaching the 20-year service mark.

All state mandated district staff annual trainings were completed on schedule. In addition, several staff members maintain Class 2 Hoisting Licenses, Class 4G Hoisting Licenses, Pesticide Applicators Licenses, and Prescribed Fire Certification. These licenses require additional continuing education and physicals.

The Central District manages 31 properties that have agricultural parcels open for licensing. These parcels are licensed to farmers through an open bidding system and licenses run for five years with an additional five-year option to renew. Currently, most of these parcels are in hay, however, there is some acreage that are used to grow field crops. This land management strategy allows the for the maintenance of open space by cooperative farmers which frees district staff to attend to land management duties on non-agricultural lands. In FY 2023 none of the licensed parcels came up for renewal. If there are farmers who are interested in being notified when parcels do come up for bid, they should contact the district office.

In addition to agricultural License Agreements, the District Office issued three licenses for authorized snowmobile trails again in FY 2023. While motorized vehicle access is generally not allowed, concessions were made in these instances to allow access on three pre-existing trail routes that connect to the main stem Snowmobile Association of Massachusetts trail system. Access is only allowed under certain snow-pack conditions which protect the underlying resources. The weather was generally unfavorable for snowmobiles in Central District in FY 2023, and the licensed trails went unused for most of the season.

In the Central district we are currently managing 51,350 acres of land, including conservation restriction holdings. This responsibility means constant monitoring and maintenance activities, including being vigilant regarding encroachment. In FY 2023 we worked with DEP and EPO staff to assess and address a major encroachment at the Millers River WMA. An abutter illegally cleared land and trees on MassWildlife property, removed part of a stone wall, and dumped trees and other cleared material into a wetland on the WMA. The corrective actions are being enforced by DEP and EPOs and are ongoing. We also worked with EPOs on removal of a homeless encampment and ATV trespass at Sevenmile River access in Spencer. These situations are always unfortunate and difficult to deal with but are necessary to maintain the integrity of the lands for all users.

The Central District annually contracts boundary marking and re-marking work for new acquisitions and in areas that have particularly complex boundary lines, some of which are not surveyed. In FY 2023 in addition to boundary marking work, we contracted a boundary survey of parts of Quaboag WMA off Quaboag St. in W. Brookfield. These boundaries have been somewhat unclear since the land was purchased decades ago, and the survey work was needed to clarify our ownership and access into the WMA. We were pleased to learn that our presumed access to the parcel was confirmed,

and that the correct boundary line makes that part of the WMA larger that we had believed. We will be working on re-marking the lines in question in FY 2024.

The district participated in the administration of two parcel exchanges in FY 2023. The Massachusetts Department of Transportation (MassDOT) was required to purchase land and mitigate wetlands as part of a reconstruction project on Route 20 on the Charlton-Oxford line. MassDOT did not want to maintain care and control of this land and partnered with DFG to transfer it to MassWildlife. This exchange created the Little River WMA. MassDOT is also installing a parking area on the WMA off Bay Path Road as part of the project. We expect this will be completed sometime next fiscal year. Another highway reconstruction project, this one in West Brookfield on Route 9, required a few permanent easements along the highway taking less than 1 acre of Coy Hill WMA land. In exchange, MassWildlife acquired 26 acres from the Town of West Brookfield adjacent to Route 9 on the West Brookfield-Ware town line. This acreage protects a headwater stream that eventually flows into the Ware River.

Stewardship, Management, and Habitat Restoration

Coy Hill Clean Up Day volunteers pose in front of a dump truck load of trash collected from the WMA.

The agency organized and registered participants for WMA clean-up events in each district across the Commonwealth in FY 2023. The clean-up event in Central District took place on June 4, 10:00 a.m.—12:00 p.m., at the Coy Hill WMA in West Brookfield. The event went very well with a total of 15 people, staff and volunteers, pitching in. We were able to remove over 30 yards of trash, including an old refrigerator, microwave, building demo debris, old furniture, a bicycle, and lots of miscellaneous trash. A big thanks to members of the Backcountry Hunters and Anglers, who made up a large portion of our volunteers.

There have been several habitat restoration and biodiversity projects in the district. Some were completed in FY 2023, and some are ongoing. The largest project, which kicked off at the end of FY 2022, but began in earnest with ground activities in FY 2023, is the five-year license agreement with the Army Corps of Engineers (ACOE) for land management activities on ACOE controlled land at Birch Hill. Phase one of the planned timber harvest was completed over the summer. A stand of red pine that was beginning to succumb to insect damage was removed off Elm Street in Baldwinville. The logs harvested are destined to become telephone poles, sequestering their carbon for many decades to come, and opening the forest canopy to allow further carbon sinking by fast growing early successional forest regeneration. Ultimately, over the five-year period, we hope to treat 4-5,000 acres, reverting it back to pine barrens habitat. This is a globally rare, fire-dependent habitat type and we have very few examples of it in interior Massachusetts. Although MassWildlife does not conduct commercial timber harvest sales with the purpose generating maximum income (our focus is on habitat restoration, biodiversity, and management), any proceeds that do come from the habitat work at Birch Hill must be reinvested in property management onsite at the Birch Hill complex per the license agreement with ACOE.

We worked alongside the CR Stewardship Coordinator to review and ultimately approve a timber cutting plan for the New England Forestry Foundation on land they own adjacent to Muddy Brook WMA. That treatment was completed in the spring of 2023. In addition, the District staff assisted in monitoring a timber cut we conducted on Muddy Brook WMA on the south side of Patrill Hollow Rd. The wet, muddy spring weather presented a challenge at that sight and significantly slowed progress on the project. This extended the completion of the project into next fiscal year; however, we do anticipate completion sometime in the summer of 2023.

Our office issued a license agreement for a landowner to access a private inholding on Coy Hill WMA for a timber harvest. The log landing is on Route 9 in West Brookfield and when the harvest was completed we required the contractor to leave

the landing as a new, roughed-out parking area for the WMA, which they did. The Lands Committee had previously approved this inholding parcel for purchase, and we closed on it shortly after the habitat treatment was completed. In the coming year we anticipate top-dressing the parking area with gravel and adding new WMA signage.

In 2018, the Dept. of Conservation and Recreation conducted a watershed timber harvest on Oak Hill within the Barre Falls WMA in Rutland State Park. Over the last few years, we have been stocking these fields with pheasant, however they had regenerated with a lot of new woody growth and had become nearly impassable. During the winter of 2023 staff conducted two weeks of habitat management work to reclaim the fields on Oak Hill. Additionally, DCR staff reclaimed the fields south of the access road and reverted them to open field as well. Long term the goal is to manage the area with prescribed fire.

Regarding prescribed fire, district staff have continued involvement with the agencies' prescribed fire program. The fall of 2022 had weather that was more conducive, whereas the spring of 2023 was extremely wet which hampered efforts. Despite the challenging weather we had to contend with, we were able to conduct burns at Muddy Brook, Quaboag, Bolton Flats, and Birch Hill WMAs. Aside from the prescribed fire events themselves, district staff spent time cutting in fire breaks, and fire roads in preparation for continued treatment activities. Outside of the Central District, our staff members also traveled to participate in prescribed fire work at several other locations including Southwick, Montague Plains, Herman Covey, Karner Brook, Fairfield Brook, and Francis Crane WMA's. These staff members maintain their preparedness by participating in Wildfire Certification Training and Fire Shelter Training.

We received good news late in FY 2023; the agency has been awarded grant money to work on several dam removal projects that have languished for many years. We assisted our engineering contractor to get preliminary survey work completed, and we anticipate removal of the following dams within the next year or so: Cusky Pond – New Braintree, Arnold & School House Pond – Sutton, Muddy Brook – Hardwick, Thousand Acre Pond – Athol and Salmon Brook – Brookfield. More news to come in FY 2024 on these projects.

One of the more time consuming and significant habitat maintenance activities we engage in annually is seasonal mowing. There are several hundred acres of open fields that our staff mow each year to maintain them as grassland. Although we visit these properties every year, the goal is never to mow them completely flat, but to remove pioneering woody plants that are beginning to establish themselves in the open field areas. To accomplish this, we have staff operating 2-4 tractors daily from July 16th (the end of our treatment blackout window for ground-nesting birds) through the end of September and beyond if weather conditions allow.

Our Stewardship Biologist was also busy with WCE/WCR monitoring visits and reports. There are nearly fifty properties in Central District where MassWildlife holds a conservation restriction or easement, and each site needs to be monitored and visited each year to ensure the easement requirements are being adhered to.

We completed boundary re-marking at Minns Wildlife Sanctuary in Princeton. This re-marking took a total of two days, and when the Stewardship Biologist returned to the property to complete the second day of marking, he found that many of the new signs had already been torn down. This is not an isolated incident; it is a frequent problem on MassWildlife lands.

Research and Conservation

Wildlife

The district staffed six biological check stations during the first week of shotgun deer season. This was one less that last year due to the closing of Old Glory sporting goods store on Route 9 in Spencer. As was the case last year, our staff assisted the agency Deer Biologist in collecting samples from dozens of White-Tailed deer to test for the presence of COVID. Samples from last year revealed nearly 30% prevalence.

Upland bird season wrapped up just after the Thanksgiving holiday. Central District stocked over 13,000 pheasants at 15 different properties over the course of the 6-week season. Due to safety concerns at River Bend in Uxbridge and a lack of suitable habitat at West Hill Dam in Menden, stocking of pheasants at those two locations was suspended in FY 2023. We worked with the ACOE staff at West Hill to improve habitat for pheasant stocking over the

winter and spring and anticipate resuming stocking there in FY 2024.

The Central District Wildlife Biologist and staff worked with our agency Black Bear Biologist, David Wattles, to conduct winter black bear den survey work in February and March. We attempted to recapture 6 sows during denning season, and we were successful with five of them. The sixth had denned in an area of thick mountain laurel and would wake and escape. No matter how quiet we tried to be, she would hear us coming, and after the second attempt we decided it was better to not try again. Of the five collared sows we did handle, there were 10 newborn cubs observed, and 3 yearlings that we had previously surveyed as newborns. During the barrel trapping season in May/June only one small male was captured in the FY 2023 season.

Warm weather and rain made ice in the swamps and backwaters unstable for most of the winter season in FY 2023. Due to these unstable conditions, we were not able to get to all of our Wood Duck boxes for maintenance. In a colder season with stable ice the district will maintain over 160 wood duck nesting boxes at 35 sites, and we will assist the Waterfowl Biologist with an additional 90 boxes at 10 study sites. This year we were only able to get to two-thirds of the existing locations.

Mallard nest structure installed at Richardson WMA

Central District Staff experimented by installed 6 "hen houses" at three different WMAs where mallards are known to nest. These "houses" deter predators and help negate changes in water levels resulting in an increase in successful Mallard nests. We will be monitoring these nests and if successful we plan to build and install more where appropriate in the District.

We assisted the Waterfowl Biologist in completing the Park Waterfowl Survey for 2023. This survey has been done every 5 years since 1973. The survey is of sites where mallards are being fed, either regularly or by visitor handouts. It is conducted over a roughly two-week period in the middle of the January. The goal is to "determine the size and species composition of park waterfowl populations, their locations, movements, biology, and population dynamics; and to determine the value of park waterfowl populations in economic and recreational terms."

The annual banding of Canada Geese was conducted in June 2023 and staff were able to capture and band our allotment of 150 previously unbanded geese and goslings in three days. In addition to goose banding, our staff also participated in breeding plot surveys for other waterfowl, Ruffed Grouse Drumming surveys and a Woodcock Peenting survey.

The Central District Wildlife Biologist and District Supervisor continue to maintain their training and certification for wildlife immobilization. We are members of the state Large Animal Response Team (LART), and work with the Environmental Police in our district whenever moose, bear, or deer wander into areas that impact public safety. In FY 2023, of the few incidents we were called to, a black bear sow and her two yearlings were relocated after finding themselves stranded in downtown Leominster. The sow and her female yearling were both fitted with collars and are now part of the ongoing Black Bear study. Fortunately, most of these situations resolve themselves when the animals make their own way back to adjacent open spaces.

Fisheries

Surveys of over 40 streams throughout Worcester County were conducted to assess fish communities and identify cold water resources. With summer FY 2023 water levels so low, monitoring potential impacts to our water resources and fishes is particularly critical. Many streams that usually flow year-round were documented as being dried-up. We will continue to monitor streams and fish communities to detect and manage impacts. Our

district Fisheries Biologist also assisted the Natural Heritage office with surveying mussel species of concern on the Ware River.

In September of 2022, Central District staff supported efforts to better understand stream habitat use of trout and salmon with collaborators at MassWildlife Field Headquarters as well as USGS. Backpack electrofishing surveys were conducted to evaluate landlocked Salmon spawning in tributaries of the Wachusett reservoir. Backpack electrofishing was also employed to assist USGS in their study of Brook Trout thermal habitat use (water temperature preferences) through the recovery of previously deployed thermal data loggers.

Wachusett and Quabbin lake trout surveys continued again in FY 2023 to assess the size and health of these populations. The Fisheries Biologist focused her efforts on the Wachusett fishery while our technicians assisted the Valley District office on Quabbin. Surveys occur at or near the point of lake turnover, when surface water temperatures cool enough to mix with cool, nutrient rich deep water. This coincides with lake trout spawning timing, making it an effective time to target these fish – they're on the move near shore and we can place gill nets to capture them, collect data, and then release them back to the water. Both the Wachusett and Quabbin surveys were successful, each tagging at least one hundred lakers.

Our district also assisted the Palmer hatchery with trout spawning this year. It is a year-round and team effort to ensure that our trout stocking program remains robust and provides our anglers with the best fish we can.

Fall trout stocking began in Worcester County at the end of September and continued through mid-October. Due to the low water levels and warm temperatures attributed to our summer weather conditions, only lakes and ponds were stocked in the fall of FY 2023. This decision was made to ensure that stocked fish have the best chance possible to remain in good condition through the fall and winter months for anglers.

Spring stocking experienced completely opposite weather from the prior summer and fall. We had a lot of cold rainy days throughout most of the stocking weeks and had no problems with warm or low water levels. All together between the fall and spring efforts, we stocked over 110,000 Trout throughout the district, and our fisheries biologist and technicians happily supported 9 different derbies and educational events through stocking efforts.

Biologists from Central District and Field Headquarters conducted a site visit to Lawrence Brook in response to a fuel spill nearby of between 100-200 gallons. A small amount made its way into the waterway itself. The Dept. of Environmental Protection and other responders had placed containment booms to stop the further spread, and it appeared to have been largely contained. No negative impacts on local fishes were observed, and containment booms were effectively preventing downstream movement of fuel into Lawrence Brook WMA. We will be monitoring the site for any lasting impact on the habitat.

Our fisheries biologist, Becca Colby, has been assisting with fisheries research on several fronts in FY 2023. She is collaborating with researchers at UMass Amherst who are addressing links between biodiversity and climate change in freshwater systems. She hopes that this work will help inform decisions and prioritization for conservation and restoration of freshwater species and habitats in our District. Becca has also been assisting one of our headquarters biologists with a local streamflow study by providing statistical and coding support.

In addition, she spoke at two professional conferences in FY 2023: at the River Herring Coalition meeting in Lakeville, MA. She presented some of her previous research and participated in Q&A for River Herring wardens, volunteer fish counters, non-profit organizers, university researchers, and other government managers. At the Northeast American Fisheries conference in Boston, Becca presented some of her previous work examining the impacts of drought on Alewife populations, and she completed a workshop on assessing small dams and fishways for restoration or removal.

Also, in support of ongoing research at U.S. Fish and Wildlife Service and UMass Amherst, she visited the Cronin Aquatic Resource Center to share her expertise in interpreting river herring scales. The scales of river herring (and some other species) grow annual markings, like tree rings, and the spawning migration of these fish can leave additional distinct

marks. By sampling the scales of these fish, biologists can estimate how old a fish is and how many times it has spawned.

Natural Heritage and Endangered Species Program

The yearly Bald Eagle Survey was completed, and no new nests were documented in Worcester County, however, several nesting pairs built new nests in the same locations. The district has also been assisting with a PFAS project being conducted by the Biodiversity Research Institute (BRI) located in Maine. A local graduate student is working with BRI to obtain samples from Bald Eagle chicks to check for the presence of PFAS in their bloodstream. The eagle chicks are simultaneously being banded in conjunction with the study. In Central District three nests were surveyed for this study, which will be repeated next season. We banded several chicks, however the PFAS results won't be available until the study in completed and published.

Enhancement of Outdoor Recreation

When considering manmade impoundments, the agency usually focuses on removals and restoration of a watershed to its natural, pre-colonial state wherever practical. However, one MassWildlife-owned dam that is not going to be removed is on Adams Pond in Sutton, which is part of the Merrill Ponds WMA complex. Although we have been conducting ongoing dam removals and infrastructure replacements up and down the Singletary Brook watershed there, Adams Pond will be retained as a warmwater fishing and recreation destination at Merrill Ponds. The contractor T. Ford was awarded the bid to renovate the Adams Pond Dam and work began towards the end of FY 2023. District staff were tasked with taking down hundreds of trees that had encroached upon the old dam structure before an April 1 deadline. This was done successfully with no injuries. Subsequently, the contractor came in and removed all debris, grubbed out all the stumps, and began the re-construction process before the end of FY 2023. This will be a long project. We anticipate completion sometime in 2025. When finished, there will be a new parking area and access road, reconstructed dam and spillway, spillway platform that allows for walking access and fishing, and a car-top boat launch ramp.

New WMA-specific roadside signs were installed at several of our WMAs, and we installed two new steel fabricated gates at Muddy Brook WMA to be used for prescribed fire access. We also upgraded the gravel parking lots at Poutwater, Raccoon Hill, Moose Brook, Quinapoxet River Access, and Millers River WMA sites in FY 2023.

A special effort was made this year to increasing the recognition and use of urban fishing areas. Multiple points have been added to the Massachusetts Fishing Spots map, and our Fisheries Biologist has been working with the Worcester Lakes and Ponds Program to bolster fishing education events in the district.

Outreach and Education

District staff participated in a Governors event along with the Secretary of EEA and other dignitaries at Birch Hill WMA. The tour outlined our previous work and detailed ongoing timber harvesting and prescribed fire management.

District staff partnered with the Angler Education Program to conduct Learn-To-Fish clinics during the spring of FY 2023. These clinics are designed to provide an opportunity to introduce fishing to people with little experience. Inner city areas were targeted for the events to demonstrate to participants that fishing is a fun activity that can be enjoyed close to home regardless of where you live. This season we conducted clinics at Bell Pond in Worcester, Dunn State Park in Gardner, and Barrett Pond in Leominster. The Bell Pond event was expanded to include a live demonstration on how to clean fish once caught, and different methods used in preparing trout on the grill.

The District Supervisor participated as an instructor in both the Basic and Bow Hunter Education courses at the Mass Junior Conservation Camp. This two-week annual summer camp introduces young people to a wide variety of outdoor skills and activities, and district staff have participated in conducting camp in some capacity for many years.

District staff worked with O&E to produce video content on cleaning and preparing panfish, and another video on how to render and use bear fat for cooking. Additional content regarding our fish stocking program was created in the district and used across our agency social media platforms.

Central District staff participated in operating the agency booth at the Fall 2022 Huntstock event in

Westminster. This event brings together constituents and vendors from the hunting industry. We were able to interact face-to-face with outdoors people, answer questions, and through demos and educational displays we help people engage with the agency directly.

As a component of our overall outreach efforts, the District Supervisor continues to disseminate monthly activities reports, is a guest speaker at several meetings, and has been a guest on local talk radio shows throughout the year keeping constituents informed and answering inquiries.

Technical Assistance

The Central District staff handle numerous wildlife calls regarding general questions, sightings, and conflicts. These inquiries are wide ranging, from question about how to protect property and livestock from wildlife predation, to simply identifying specific species.

With black bears range expanding eastward through the Central District, we find ourselves providing information to the public regarding how to live cohesively with these large animals. Many callers have no experience with bears and are only beginning to see them for the first time in some parts of the district.

Many callers contact us looking for information on how to handle injured wildlife. Sometimes we can refer them to a wildlife rehabilitator listed on our website, in other instances it's best to allow nature to take its course. In at least two instances in FY 2023 we responded to transport injured raptors to the Tufts Wildlife Veterinary Center in Grafton. While we are not able to respond in every case, we will make the effort when there is a good chance for survival.

Connecticut Valley Wildlife District

Administration

The Connecticut Valley District office was pleased to announce that Kevin Chaffey has filled the position as DFG's District Land Agent starting in August of 2023. Mr. Chaffey is filling the position left vacant when Christina Petersen retired last year. Kevin grew up in the town of Montgomery and is a graduate of Antioch University and served as Springfield Conservation Agent for 12 years before coming to work with DFG and MassWildlife. We are lucky and excited to have him onboard. No new agricultural licensing agreements were issued within the Connecticut Valley District's WMAs in FY 2023. Our existing agreements will continue to be maintained when they provide a benefit to wildlife by maintaining open space habitat in places that would otherwise not be actively managed due to staffing, equipment, and time constraints.

Working collaboratively with the Department of Conservation and Recreation (DCR), the Conn. Valley District staff sold 2,260 Quabbin one-day fishing Licenses; 1,980 of these were from credit card sales. The licenses were issued at the three boat launch areas on the Quabbin Reservoir and totaled $11,300 this fiscal year.

The Swift River primitive camping area remained closed for FY 2023.

The Valley District issued two field trial permits in FY 2023 for events held on Herman Covey Wildlife Management Area. These are the first field trials held since last year's regulation changes allowing for live fire trials on the WMAs. Both the New England Vesla Club and the Central New England Brittany Club held events at the facility and expressed the appreciation for the recent regulation changes as well as the condition of the recently reclaimed bluestem fields.

Stewardship, Management, and Habitat Restoration

This year the focus of boundary marking efforts within the district prioritized the unmarked fishing access areas across the district. The heavy rains this year did create several setbacks due to flooding along the Deerfield and Connecticut rivers, but despite that a total of 11.63 miles of property boundary lines were confirmed by the Stewardship Biologist and then marked by contracted boundary marking teams.

Annual monitoring visits and reports were conducted on Conservation Restrictions (CRs)

throughout the district in FY 2023. Annual monitoring is a legal obligation under the terms of each CR and is also critical to protecting the conservation values of these properties. Landowners were contacted via letter and invited to participate. Participants who decided to come along for the site visits provided a good perspective on the land's history and current use, as well as a chance to build relationships with these landowners. New ownership of the underlying fees of several CR's offered the opportunity to forge new connections and foster excitement for the work that MassWildlife does in habitat management, forestry with these new landowners. We are excited to work more with them in the future!

Under the agency's current Walking Trails Policy, proposed trails and maintenance of existing trails must undergo an in-depth application and approval process. Work continues with Kestrel Land Trust to bring sections of the Robert Frost Trail into compliance with this policy. The Valley District also monitors the existing licensed trails in the district – the Tully Trail within the Tully Mountain WMA, Fish Brook WMA, and Tully Mountain WCE and the New England Trail that winds through East Mountain WMA and the Tully Brook Access.

Use of WMAs continued to see a marked increase compared to previous years resulting in ongoing issues stemming from the influx of new user groups. Dumped materials continue to be removed from WMAs and monitoring of these areas has increased in FY 2023. Parking areas and access points were improved by district staff at several of the WMAs throughout the district. Parking lot maintenance continues to be a focus for stewardship and staff.

Improvements and maintenance included widening existing parking areas, improving surfaces with gravel, boulder exclusions to limit illegal off-road access, installation of new gates, repair and/or maintenance of existing gates, and motorized vehicle trespass deterrence. All WMAs were posted with rules and regulations. Signs are posted at public access entrance points at 35 WMAs throughout the district.

Approximately 119 acres of fields were mowed at nine WMAs this year (15 acres at Satan's Kingdom, 25 acres at Southwick WMA, 20 acres at Southampton WMA, 7 acres at Herman Covey WMA, 5 acres at Poland Brook WMA, 36 acres at Leyden WMA, 10 acres Montague Plains WMA, and 1 acre at Great Swamp Whately (WMA).

A total of 452 acres of grasslands and shrublands were burned under prescribed fire plans at four WMAs (39 acres at Leyden WMA, 143 acres at Montague Plains WMA, 40 acres at Herman Covey WMA, and 230 acres at Southwick WMA). One additional District staff was trained as fire fighter type 1 bringing the total number of district staff qualified to participate in prescribed fires to 5. These individuals are used to assist with prescribed fires though out the state when doing so improves wildlife habitat.

District staff spot treated 161 acres of invasive plants with herbicide treatment on five WMAs (39 acres at Leyden WMA, 15 acres at Satan's Kingdom, 65 acres at Herman Covey WMA, 4 acres at Southampton, and 36 acres Southwick WMA).

On the Conn. Valley District Staff discovered Frosted Elfin at one of the Sandplain Lupine restoration sites on Montague Plains WMA for the first time since agency restoration started there. Staff collected and planted 175 Sandplain Lupine seeds this fiscal year. Several firebreaks were mowed and/or maintained at Montague Plains WMA, Southwick WMA, Herm Covey, and Leyden WMA for prescribed fire management on those properties.

Research and Conservation

Wildlife

Valley District staff contributed to the statewide wildlife survey efforts by completing 8 Ruffed Grouse drumming survey routes and conducted Wild Turkey brood surveys. Staff also banded 99 Canada Geese at seven sites. Only a total of 50 Wood Duck boxes were checked and maintained at 12 sites this fiscal year because of the mild winter and lack of ice on ponds. Blue Bird and Kestrel nesting boxes were maintained at several WMAs as well.

Valley District staff monitored the survival and reproduction of 22 radio-collared female black bears during this reporting period. Two collared females died during the reporting period. We suspect that one was killed illegally by a poacher and the other was struck and killed by vehicle. One collared yearling female slipped her collar. Attempts were made to capture 18 collared females in their dens to determine reproductive success and first-year cub

survival, 16 of the females were successfully immobilized and handled in dens. It was determined that 13 females had newborn cubs, 2 had yearling cubs, and one adult female was barren. Two yearling females captured with their mothers in the den were radio collared. Global Positioning System (GPS) collars were affixed to bears to monitor locations every 45 minutes. Bear traps were set in the spring and early summer to recapture a female bear with a GPS collar that malfunctioned and to add new females to sample size. In total this year 18 bears were captured during trapping, 8 new bears (5 males, 3 females) and 8 previously tagged bears (4 males, 4 females).

Ten check stations in the district were open to check hunter harvested animals this year and 8 biological deer check stations were staffed by district personal during the first week of deer shotgun season.

Valley District staff stocked 10,000 pheasants on 10 agency owned WMAs, 6 government or town owned properties, and 10 privately owned hunter accessible properties prior to and during the 6-week long pheasant hunting season. The WMAs stocked by district staff this year included: Herman Covey WMA, Poland Brook WMA, Leyden WMA, Montague Plains WMA, Connecticut River WMA, Bennet Meadows WMA, Pauchaug Brook WMA, Southampton WMA, Southwick WMA and Whately Great Swamp WMA. Towns stocked within the district included: Amherst, Belchertown, Brimfield, Conway, Deerfield, Hadley, Hatfield, Holland, Brimfield, Leverett, Leyden, Montague, Northfield, Northampton, South Hadley, Southampton, Southwick and Whately. A complete list of pheasant stocked properties within the district can be found on MassWildlife's website at: https://www.mass.gov/service-details/pheasant-stocking-connecticut-valley-district.

Fisheries

This annual report period covers the Fall 2022 and Spring 2023 trout stocking seasons, which are covered in some detail in the following section. The Fall 2023 stocking season in the Connecticut Valley District ran from 09/28/2022 to 10/19/2023. Trout stocked in the district were allocated from McLaughlin (29% by #), Bitzer (54% by #), and Sunderland (17% by #) hatcheries. In total 14,683 fish, totaling 15,540 pounds were stocking by district staff, with assistance from hatchery staff on several loads. Stocked fish were 93% Rainbow Trout and the remaining 7% Brown Trout, with 85% of all stocked fish 12 inch or greater in size. Thirty different waterbodies were stocked, 6 Rivers and 24 Lakes/Ponds. Extremely low water, due to drought conditions, in stocked rivers resulted in modifications or reductions in stocking locations, or the removal of the water from the stocking list for the season. The Spring trout stocking season, a much larger stocking effort than the Fall, ran from 03/21/2023 to 05/26/2023 with an additional stocking to the Swift River on 06/30/2023. In total 87,837 trout, weighing 66,826 pounds were stocked in district waterbodies. Trout from all five state hatcheries were stocked (Bitzer 11%, McLaughlin 50%, Reed 0.4%, Sandwich 0.6%, Sunderland 38% (by number)) in the district. Spring trout stocking species composition as 55.6% Rainbow Trout, 29.3% Brown Trout, 14.7% Brook Trout, and 0.4% Tiger Trout, with 74% of all trout stocked at 12 inches or larger in size. A total of 89 different waterbodies were stocked in the spring season, consisting of 30 ponds/lakes and 59 rivers/brooks.

The fiscal year reporting period splits the summer sampling season in half, so numbers reported below include surveys and sampling efforts for the second part of the 2022 season and the first half of the 2023 season. As in other years, district staff completed a variety of smaller scale electrofishing surveys on district ponds and streams. Some of these surveys are to update out-of-date sampling data from older sampling efforts, to collect data on unsampled locations, or to work with other agencies on specific projects such as dam removals and research. In total, district staff completed 40 electrofishing surveys, and participated in 7 mussels sampling surveys. As in previous years, district staff organized field work for an ongoing study on Quabbin Reservoir Lake Trout. In 2022 33 gillnets were set over 6 different nights in an effort to capture/re-capture, measure and tag spawning Lake Trout. In the 2022 netting season a total of 102 individually identifiable PIT tags were implanted in adult Lake Trout, and 13 tagged fish (tagged in previous years) were recaptured. Additionally, 52 Landlocked Atlantic Salmon, 22 Smallmouth Bass, and numerous other species were sampled during this study.

Of special note during this reporting period, a new largescale project focusing on the movement and growth of wild Brook Trout in the Swift River was launched. This project had been in the development stage for several years prior, but official work began in the spring of 2023. MassWildlife has partnered up

with the Pioneer Valley of Trout Unlimited (PVTU)and the Massachusetts Outdoor Heritage Foundation (MOHF) to complete this work, with important funding provided by both groups, and much needed and appreciated volunteer assistance provided by PVTU and the membership. At the time this report was written, the work was still ongoing, approximately halfway complete with installation of the field sites. More detail about the methods and goals of this project are available at www.mass.gov/swift-trout. This website was advertised locally and on signs at each of the field locations. No fish has yet been tagged at the time of this report, but initial field tests with PIT tags at each of the two sites were extremely promising. Completion of the two remaining field sites and tagging the first batch of wild fish is slated for completion by the end of the year.

Natural Heritage and Endangered Species Program

The Valley District staff continued its efforts to monitor and band eagle census covering Hampshire, Hampden, and Franklin counties. District staff identified and monitored 35 breeding Bald Eagle territories.

The district cooperated with NHESP staff on a variety of projects throughout the district this year. Valley District staff also assisted FHQ staff with four whip-poor-will surveys within the district.

The district continues to help and learn more regarding the identification and sampling protocols for surveying listed freshwater mussels. For this reporting period, district staff assisted with four mussel snorkel surveys in local waterways.

Enhancement of Outdoor Recreation

Valley District staff administered the annual controlled waterfowl hunt at Ludlow WMA. Twelve hunters applied for this year's raffle style permits and all those who applied were drawn to participate in the hunt. In preparation of the hunt the Valley District staff cleared and maintained approximately 1.25 miles of access trails and four duck blinds on the property.

Five sportsmen's clubs within the Valley District participated in the Club Pheasant Program this year. District staff received and distributed 1,120 seven-week-old pheasants to these clubs in July. These birds will be released on properties open to public hunting during the regular hunting season for sportsmen and sportswomen to enjoy.

Outreach and Education

Numerous public events were held during the 2023 trout stocking season, and often included participation from the whole stocking crew and the hatchery staff that sourced the fish. Several events were held during Earth Week, which is also the spring vacation week for many local schools. As a standard approach at most these events the public is given a brief presentation and then participates in the stocking effort using buckets. These continue to be a very positive experience, and the district keeps adding new events each season, a total of 6 were held in spring 2023. Local media, including newspaper and television often attend the larger events, which were hosted at Hampton Ponds in Westfield, and Forest Lake in Palmer this year.

Technical Assistance

Our District offices are often our first line of contact to the public. The Valley District office was open to the public and district staff answered hundreds of calls requesting technical assistance regarding wildlife and fisheries concerns. Staff addressed the needs of callers ranging from hunting and fishing license sales, requests for information, aided with nuisance-animal complaints, assistance with injured wildlife and hunter harvest reports for hunters without access to computers.

Western Wildlife District

Administration

The District welcomed Colby Kellogg-Youndt, Wildlife Technician II to the office in September 2022. Colby brings a wide variety of knowledge and experience to the position and has quickly become an important member of the team. The District hosted an intern from Westfield State University for the spring semester and a service-learning program student from Wahconah High School. Both assisted District staff with a variety of tasks while learning about conservation and the Agency.

Large Animal Response Team (LART) cases in FY 2023 included responses to deer, bear, and moose.

Outcomes of these call varied depending on the health and safety of the animals and the public. In addition to these in-person cases, District staff responded to numerous large animal calls and questions.

The District Supervisor continued working on issues related to snowmobile trails on Wildlife Management Areas. This included trail assessment and numerous meetings with Snowmobile Association of Massachusetts officials. Agricultural License Agreement issues also required substantial time from the District Supervisor and Wildlife Biologist.

District staff completed all state mandated training and participated in a federal Aid workshop/training at field headquarters. All Western District employees were trained in CPR in FY 2023.

In April 2023, during a routine site visit, the District discovered that the outlet structure at the Three Mile Pond Dam (a.k.a. Beaverkill Dam) was obstructed. Attempts to clear the outlet were unsuccessful and water level continued to rise. The District implemented the Emergency Action Plan and contacted all relevant parties. District staff constructed temporary siphons to alleviate pressure on the dam. Ultimately a confined space diver was retained to clear the outlet structure. District staff spent many long days managing the issue.

Stewardship, Management, and Habitat Restoration

The Stewardship Biologist is responsible for coordinating efforts on boundary marking, encroachments, access, Conservation Restriction (CR) monitoring, and other land management activities. The Stewardship Biologist is the point of contact for contractors working on boundary marking and surveys. A total of 8 miles of property boundaries were marked in FY 2023 by District staff. Marking efforts were spread throughout the District prioritizing new acquisitions and previously unmarked properties. The Western District has responsibility for close to 70,000 acres between Wildlife Management Areas and Conservation Restrictions including hundreds of miles of boundaries.

The Stewardship Biologist completed 35 monitoring visits to Conservation Restrictions. He reviewed multiple forest management plans, in conjunction with the Wildlife Lands Stewardship Coordinator and Habitat Program.

The District continued to add new signage at WMAs including welcome signs at parking areas and 10 new routered signs along roadsides which help users identify MassWildlife conservation lands.

District staff maintained parking areas at 12 WMAs and 4 Public Access ramps, mowing, weed whacking, cleaning trash, and repairing gates. Stone was added to improve parking and access for pheasant stocking at the George Darey Housatonic River WMA. District staff renewed training in prescribed fire. In FY 2023, six members of the District staff were part of the prescribed fire team. Two Western District WMAs were added to the project list and successfully burned for the first time, totaling over 30 acres. The prescribed fire at Karner Brook WMA was part of a long-term restoration of an ecologically important calcareous fen.

Research and Conservation

Wildlife

Annual surveys for Woodcock (3), Ruffed Grouse (7) and waterfowl indicated pair surveys (4) were conducted in the district. Staff also cleaned, constructed, or installed more than 120 nesting boxes for wood ducks, 60 bluebird and 10 kestrels.

Western District personnel implemented multiple habitat projects, including annual brush mowing over 400 acres across 13 different WMAs and pruning more than 50 apple trees on 2 WMAs. Staff also coordinated with the Habitat Section on projects, including management plan review, site visits, and logistical support.

The District deployed loon rafts at Cleveland Reservoir in Hinsdale and Ashley Reservoir in Pittsfield. The District Supervisor and Wildlife Biologist coordinated with the Biodiversity Research Institute on planning for a loon relocation project in FY 2023. One-hundred Canada Geese were banded throughout the District in June 2023.

The District had continued success with the bear trapping and collaring program. Four new female bears were collared and many others ear tagged. Bear trapping requires substantial effort but has provided some very important local data which has

been directly relevant in explaining and, in some cases, reducing bear conflicts in the region. Nine dens were visited over the winter resulting in 7 successful captures.

Fisheries

River and stream surveys were difficult to accomplish in FY 2023 due to extended drought conditions during the 2022 summer season. A total of 18 surveys on 13 waters were surveyed by Western District staff July and august 2022. District staff also assisted the fisheries section with trout collection surveys in the Deerfield River. Three waterbodies were surveyed by boat electrofishing in June 2022: Onota Lake, Norwich Pond and Littleville Reservoir. All fish were identified and measured to the nearest millimeter and weighed before being returned to the water.

The Hoosic River was surveyed by backpack electrofishing at several locations in response to a spill that occurred on the river in November 2021. The surveys were conducted to assess the presence of Longnose Sucker and note any changes to the fish community and available habitat. The river was sampled in 3 locations in Adams and 2 locations in North Adams. Staff from the Connecticut Valley District, Central District and Field Headquarters assisted with surveys.

A winter fisheries survey was conducted on February 15, 2023 on Muddy Pond in Washington. Survey methods used included minnow traps, tip-ups, jigging rods, and a gillnet set beneath the ice. Generally poor ice conditions prevented us from conducting additional winter surveys.

The Fisheries Biologist assisted the Fisheries Section in adipose clipping of Brown Trout for stocking in the Deerfield River, as part of an ongoing assessment of wild Brown Trout.

One day was spent removing invasive water chestnut from Three Mile Pond in Sheffield in July 2022, to control spread to other parts of the waterbody. Two district technicians pulled all visible emergent plants by hand from kayaks and moved them off-site for decomposition. Two days were also spent on removing water chestnut at Mill Pond in the Karner Brook WMA in Egremont. Multiple truckloads of material were removed and placed in an upland location for decomposition. This first attempt at removal at Karner Brook WMA was conducted to assess coverage on the pond, accessibility to the waterbody, and the feasibility of a larger scale restoration project at this site.

The District Fisheries Biologist and District Supervisor participated in review of the Practical Guide for Lake & Pond Management. They also spent considerable time working with Field Headquarters staff on reviewing and commenting on the proposed continuation of a winter drawdown of Pontoosuc Lake. This included submitting written comments and attending conservation commission meetings. District Staff also monitored water levels in Berkshire lakes where winter drawdown is practiced.

Natural Heritage and Endangered Species

District Staff participated in the Bald Eagle Nesting Survey. There are 9 confirmed active nests known in the Western District, in Russell, Pittsfield, Lee, Monterey, Buckland, Great Barrington, Richmond, Williamstown, and Otis. The District banded eagle chicks at the nests in Cheshire and Williamstown.

District Biologists and Wildlife Technicians partnered with NHESP to manage and enhance habitat for endangered turtles by conducting surveys, clearing vegetation, prescribed fire, and maintaining water levels. The District Supervisor attended monthly meetings of the Berkshire Fens working group with The Nature Conservancy.

Western District staff assisted NHESP biologists with several freshwater mussel surveys in Western District and elsewhere. The District Fisheries Biologist assisted Field Headquarters staff and Central and Connecticut Valley Districts staff with mussel surveys in the Ware River in Hardwick and the Fort River in Amherst in August 2022. Western District staff also assisted with the ongoing brook floater mark and recapture study on the West Branch Farmington River in Otis in June 2023.

Western District Technician Heather Sadler provided field assistance and support for contractors working on timber rattlesnakes in Western Massachusetts. District staff assisted with peregrine banding at the Tekoa WMA and conducted winter bat surveys in multiple hibernacula.

Enhancement of Outdoor Recreation

Enhancement of outdoor recreation is a core function of the district office. Pheasants were

stocked 3 days per week throughout the season. The Western District distributes 4,000 birds, released on nine WMAs: Stafford Hill (Cheshire), Eugene Moran (Windsor), George Darey Housatonic Valley (Lenox), Hop Brook (Lee), Knightville (Huntington), Hinsdale Flats (Hinsdale), Three Mile Pond (Sheffield), Flat Brook (West Stockbridge), and Peru (Peru) and 13 covers across the towns of Ashfield, Lee, Lenox, Williamstown, Hawley, Great Barrington, and Pittsfield. Overall, Pheasant stocking requires about 40 personnel days to complete each year. Pheasant chicks were provided to the Lee and Ashfield sportsmen's clubs in early FY 2023.

The Western District hosted two sites for paraplegic sportsmen to participate during the designated three-day hunt. District staff attended all hours of the hunt and, with the help of volunteers, ensured safe and successful hunting with four deer taken during the three-day hunt.

The Fisheries Biologist and District Supervisor met with the Town of Russell and other officials to improve angler access along the Westfield River where parking prohibitions have impacted fishing.

Fall trout stocking was completed over 10 days between September 27 and October 19. Fifteen waterbodies were stocked this fall: 13 lakes and ponds and 2 rivers (Deerfield River and East Branch Westfield River). The total number of trout stocked in Western District waters was 16,043 fish, the majority from Sunderland and McLaughlin hatcheries. One alteration of the fall stocking was the temporary removal of Pontoosuc Lake from the list because of a significant cyanobacteria bloom during the stocking season.

Spring trout stocking commenced on March 21, 2023. A total of 89,886 fish were stocked during the spring season into 71 waterbodies: 23 lakes and ponds and 49 rivers and streams. District staff traveled daily to MassWildlife hatcheries and brought trout back to the Western District for distribution. Spring stocking concluded on May 25, 2023, for a total of 46 stocking days.

In response to the scientific evidence collected in the wild brown trout study on the upper Deerfield River, we decided to discontinue stocking of brown trout in the section between Fife Brook Dam and the Route 2 bridge in Charlemont. All brown trout allocated for the Deerfield River were fin-clipped and stocked downstream of the Route 2 bridge in Charlemont.

Outreach and Education

Because they are in the field daily, District staff (particularly Wildlife Technicians) communicate with the public almost every day. These interactions are an important part of direct outreach for agency programs.

The District Supervisor attended monthly meetings and provided updates to the Berkshire County League of Sportsmen, attended the annual banquet, and hosted a table at the Berkshire hunting and fishing gear sale. District personnel staffed the table at the Springfield Sportsman Show greeting hunters and anglers and providing information about the agency.

District Biologists and Technicians participated in several R3 (Recruitment, Retention, Reactivation) working groups to promote hunting, fishing, and shooting activities. The District partnered with the Berkshire Environmental Action Team and the Housatonic Valley Association to conduct a cleanup at the George Darey Wildlife Management Area as part of the Finding Common Ground Workgroup. Wildlife Technician Eli Pease instructed a learn to hunt wild turkey seminar.

The Western District hosted 3 Urban Fishing Clinics in the Berkshires in August 2023, including two evening fishing clinics on Onota Lake in Pittsfield and Pontoosuc Lake in Lanesborough/Pittsfield, and a daytime clinic on Windsor Lake in North Adams. The District also hosted a public trout stocking event at Onota Lake which was attended by hundreds of people.

The District continued our excellent relationship with Wahconah Regional High School in Dalton. Staff hosted students on multiple occasions and demonstrated biological deer check, fish stocking, and electrofishing. The Fisheries Biologist assisted with a Learn to Fish class, teaching students about fishing, acquiring licenses, and casting demonstrations. Science classes from Berkshire Community College and Westfield State University joined Western District Biologists collecting data at deer check stations.

District staff presented at several meetings and conferences including Trout Unlimited Taconic

Chapter, Berkshire Lake and Pond Association Meeting, Berkshire Environmental Action Team Speaker series as well as numerous school groups. Staff also attended the Massachusetts Land Trust and the Berkshire Natural History Conferences.

Technical Assistance

District Staff operated on a full-time in-person schedule throughout FY 2023. The District Clerk answered a high volume of calls and provided technical advice on fish, wildlife, and licensing. She also answered call for the Westborough Field Headquarters. The District Fisheries Biologist continued to serve as an alternate to the Westfield River Wild and Scenic Committee.

The Western District responded to numerous wildlife situations in FY 2023. We picked up multiple hawks and owls over the course of the year. We provided daily technical advice on living with bears and other wildlife throughout the spring and early summer.

The District Supervisor and Wildlife Biologist conducted numerous site visits related to bear activity. In most cases the issues were resolved with education and information. Intentional bear feeding continued to be an issue in the Western District, causing harm to animals and disruption to neighbors. Coordinating with the bear project leader, the District has made progress guiding towns with enforcement strategies for addressing intentional bear feeding sites.

During the summer of 2022 the town of Monterey experienced a series of home entries which required extensive response primarily from the District Wildlife Biologist. Ultimately a bear had to be trapped and euthanized because the repeated home entries became a clear risk to public safety.

Wildlife District and Lands Staff

Field Headquarters

Trina Moruzzi, Assistant Director of Operations
Elizabeth Newlands, Wildlife Lands Stewardship Coordinator

Northeast Wildlife District

Patricia Huckery, District Supervisor
Chalis Bird, Wildlife Biologist
Travis Drudi, Stewardship Biologist
Leslie Gabrilska, Clerk
Anne Gagnon, Land Agent (DFG)
Joshua Gahagan, Wildlife Technician
Tim Mathews, Wildlife Technician
Ryan Meuse, Wildlife Technician
Derek McDermott, Wildlife Technician
John Sheedy, Fisheries Biologist

Southeast Wildlife District

Jason E. Zimmer, District Supervisor
Aaron Best, Stewardship Biologist
Jeff Breton, Wildlife Technician
Connor Fleming, Wildlife Technician
Daniel Fortier, Wildlife Technician
John Garofoli, Wildlife Technician
Steve Hurley, Fisheries Biologist
Joan Pierce, Land Agent (DFG)
Debra Silva, Clerk
Steve Wright, Wildlife Biologist

Central Wildlife District

Todd Olanyk, District Supervisor
John Bonafini, Wildlife Technician
Rebecca Colby, Fisheries Biologist
Scott Kemp, Stewardship Biologist
Ethan LaPlante, Wildlife Technician
Mike Morelly, Wildlife Biologist
Debra Manty, Clerk
Jessi Manty, Wildlife Technician
James McCarthy, Land Agent (DFG)
Ian Sypek, Wildlife Technician
Bruce Walker, Wildlife Technician

Connecticut Valley Wildlife District

Joseph Rogers, District Supervisor
Anne-Marie Bartus, Clerk
Kevin Chaffee, Land Agent (DFG)
Joshua Freniere, Wildlife Technician
David Fuller, Wildlife Biologist
Brian Keleher, Fisheries Biologist
Jennifer Jones, Stewardship Biologist
Kevin Pelosky, Wildlife Technician
Shasta Slade, Wildlife Technician
Walter Tynan, Wildlife Technician

Western Wildlife District

Andrew Madden, District Supervisor
Ray Bressette, Wildlife Technician
Nathan Buckhout, Wildlife Biologist
Leanda Fontaine, Fisheries Biologist
Debra Lipa, Clerk
Peter Milanesi, Land Agent (DFG)
Colby Kellogg-Youndt, Wildlife Technician
Jacob Morris-Siegel, Stewardship Biologist
Eli Pease, Wildlife Technician
Heather Sadler, Wildlife Technician

7 Federal Aid Program Administration

Lori Cookman, Federal Aid and Compliance Manager

Overview

The Federal Aid and Compliance Manager implements MassWildlife's Federal Aid Program, including oversight of documentation, reporting, compliance with acts and regulations, and other requirements for the administration of federal grants. The position also serves as the liaison between the grantee and Federal agencies – including the grant administrator of the Legacy Region 5 office of the U.S. Fish and Wildlife Service (USFWS) for the U.S. Department of the Interior, the Natural Resources Conservation Service (NRCS) and the Animal and Plant Health Inspection Service (APHIS) both of the U.S. Department of Agriculture and other grantors of federal funds such as the National Fish and Wildlife Foundation (NFWF).

Federal Aid

Wildlife Restoration (Pittman-Robertson)

MassWildlife's Wildlife Restoration Act apportionment, $11,912,373 was an increase from last year's apportionment. These funds are available for wildlife restoration projects and hunter education. The following projects were reimbursed with these funds: hunter education, wildlife population trends and harvest surveys, waterfowl research and management, wildlife habitat management, wildlife outreach and communication, expanding hunter opportunities, land acquisition, and program coordination.

Sport Fish Restoration (Dingell-Johnson and Wallop-Breaux)

Massachusetts' Sport Fish Restoration Act apportionment, $4,246,832 was an increase from last year's apportionment. These funds were divided as follows: The Department of Fish and Game's Office of Fishing and Boating Access (OFBA), which is responsible for constructing and maintaining motorboat access facilities, received $637,024.80 (15%); and the balance of $3,609,807.20 was equally divided between the Division of Marine Fisheries and MassWildlife ($1,804,903.60 each).

MassWildlife activities reimbursed under the Sport Fish Restoration Program include aquatic resources education, hatchery operations, hatchery maintenance, fish distribution, and boat accommodations. The OFBA, in cooperation with MassWildlife, had five boat accommodation grants active in FY 2023.

State Wildlife Grant Program (SWG)

MassWildlife's State Wildlife Grant apportionment of $822,122 was a slight increase from the previous year. The State Wildlife Grant funds were applied to four projects. Activities reimbursed under those projects include fish community research, anadromous fish restoration, biodiversity impact review, biodiversity inventory and research, biodiversity conservation mapping and planning, habitat evaluation, regional conservation needs, and in the implementation of the Massachusetts State Wildlife Action Plan.

MassWildlife was awarded $161,673 through the FY 2019 national State Wildlife Grant competitive program to fund the Implementation of the Bog Turtle Conservation Plan for the Northern Population, with Benefits to Associated Headwater Wetland Species of Greatest Conservation Need. MassWildlife is partnering with Pennsylvania, Maryland, New Jersey, and Connecticut. This cooperative project expands upon a previous grant that was completed in FY 2019. Implementation of the new Bog Turtle grant began in FY 2020 and will continue through FY 2025.

Also in FY 2019, MassWildlife was awarded $115,206 through the national State Wildlife Grant competitive program to fund the project entitled

Using Nanotag Technology to Identify Landscape-scale Habitat Use of Multiple Species of Greatest Conservation Need in New England. MassWildlife is partnering with the states of New Hampshire, Maine, and Pennsylvania. Implementation of this grant began in FY 2021 and will continue through FY 2025.

MassWildlife was awarded $52,000 through the FY 2020 national State Wildlife Grant competitive program to fund the project entitled Testing Salt Marsh Restoration Practices to Advance Saltmarsh Sparrow Conservation. MassWildlife is partnering with the states of Connecticut, Maine, Maryland, Rhode Island, and Virginia. This project will continue into FY 2026.

MassWildlife will serve as the lead state and was awarded $124,200 through the FY 2020 national State Wildlife Grant Competitive program to fund the Regional Conservation for Wood Turtles and Related Emydine Turtles. MassWildlife is partnering with the states of Connecticut, Maine, Maryland, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Virginia. This cooperative project will continue into FY 2025.

MassWildlife will serve as the lead state and was awarded $392,362 through the FY 2021 national State Wildlife Grant Competitive program to fund the Advancing Conservation and Restoration of Brook Floater and Associated Freshwater Mussels. MassWildlife is partnering with the states of New Jersey, South Carolina, and Virginia. This cooperative project will continue into FY 2025.

The Endangered Species Act (Section 6)

In FY 2023, MassWildlife received $60,152 in Section 6 funding from the USFWS. Funds will be used to reimburse northern red-bellied cooter adaptive management; continue support to survey for Dwarf Wedgemussel to further long-term monitoring efforts and habitat identification; to participate in a multi-state effort to better define *Agalinis decemloba,* both morphologically and geographically and assess population threats to this endangered plant; and to conduct standardized population assessments for at-risk turtle species.

Regional Conservation Partnership Program

During FY 2019, MassWildlife was awarded $150,000 in RCPP funds through a cooperative agreement with the Natural Resources Conservation Service Funds. The agreement will help to provide technical assistance to private landowners interested in conducting habitat management on their property. Implementation of this cooperative agreement will continue into FY 2025.

Miscellaneous Federal Grant Funds

In FY 2020, MassWildlife received $20,000 through a cooperative agreement with the USFWS to partially fund Habitat Restoration for Roseate Terns on Penikese Island. A portion of these funds will be used for habitat management practices to improve habitat suitability and expand nesting habitat to higher elevations more resilient to sea level rise. The remaining funds will be used to conduct tern monitoring on the island. This cooperative agreement concluded in FY 2023.

In FY 2022, MassWildlife received $75,451.07 through a cooperative agreement with the USDA-APHIS to develop a Chronic Wasting Disease (CWD) risk assessment, communication strategy and educational materials to help prevent and/or control the spread of CWD in MA. Implementation of this cooperative agreement will continue into FY 2024.

In FY2023, MassWildlife received $25,000.00 through a cooperative agreement with the USDA-APHIS to conduct activities related to ARP SARS CoV2 in Cervids. Implementation of this cooperative agreement will continue into FY 2024.

In FY 2023, MassWildlife was awarded $773,000 in Zoonotic Disease Initiative funding through the USFWS to develop a wildlife health and public outreach program for Massachusetts and to research wildlife diseases and prevent their spread within the Northeast region. This project will continue into FY 2027.

Also in FY 2023, MassWildlife was awarded $795,000 through the 2022 National Coastal Resilience Fund for Protecting Saltmarsh Sparrows and Great Marsh Communities through Salt Marsh Restoration. Funds will be used to restore 3,278 acres of salt marsh through nature-based techniques, removal of two tidal restrictions, reversing salt marsh subsidence, and maintaining high marsh to improve coastal resilience. This project will continue into FY 2026.

Additionally, in FY 2023 MassWildlife was awarded $4,900,000 through the 2022 America the Beautiful Challenge Grant for the Southeastern Massachusetts Pine Barrens Landscape Restoration and Community Engagement Initiative. This initiative will restore the site of a former cranberry bog; expand aquatic connectivity and riparian habitat; build ecosystem resilience of pine barrens, woodlands, shrublands and sandplain grasslands; and improve ecological function of coastal plain pondshores. This Project will engage landowners and collaborate with the Mashpee Wampanoag Tribe and other partners to complete large-scale restoration and build capacity for future conservation throughout the imperiled southeastern pine barrens of Massachusetts. Project completion is planned for FY 2027.

Audits

MassWildlife is subject to federal audits which are conducted every five years. MassWildlife's next audit is scheduled for federal FY 2025.

Other Matters

The Federal Aid and Compliance Manager responded to requests for information and public inquiries, managed MassWildlife's inventory, oversaw project performance and financial reporting, provided project assistance, attended trainings and meetings, and served as the liaison between Federal Aid personnel and MassWildlife staff.

Federal Aid Program Personnel

Kris McCarthy, Chief Fiscal Officer/Associate Director of Administration and Finance
Lori Cookman, Federal Aid and Compliance Manager
Debra Chamberlain, Assistant to the Federal Aid Coordinator
Debbie McGrath, Federal Aid Bookkeeper

8 The Personnel Report

Paige Jones, EEA Deputy Human Resources Director/Department of Fish and Game

New Hires: Employees

Name	Title	Date	Comment
Lawson, Sarah	Wildlife Technician II	8/28/2022	
Hernandez, Chantel	Program Coordinator I	9/11/2022	
Kellogg-Youndt, Colby	Wildlife Technician II	9/25/2022	
Meuse, Ryan	Wildlife Technician II	11/6/2022	
Conlin, Patrick	Game Biologist III	1/01/2023	
Williams, Ryan	Conservation Biologist II	1/17/2023	
McGuire, Timothy	Conservation Biologist III	1/29/2023	
Crawford, Meghan	Game Biologist III	2/12/2023	
Nicolson, Courtney	Conservation Biologist III	3/26/2023	Employee resigned in May 2023

New/Rehires: Seasonals and Other Contractors

Name	**Title**	**Date**	**Comment**
Maglio, Meredith	Contracted Seasonal Employees	9/11/2022	New/Resigned Dec 2022
Wasserman, Sarah	Scientists	11/6/2022	New
Kaisand, Alec	Scientists	11/6/2022	New
Regosin, Jonathan	Scientists	4/10/2023	Rehire
Garrison, Johnathan	Scientists	4/23/2023	New
Baran, Mark	Scientists	5/7/2023	Rehire
Liljesthrom, Marcela	Scientists	5/7/2023	Rehire
Humphrey, Stephen	Contracted Seasonal Employees	5/15/2023	New
Bradbury, Katherine	Contracted Seasonal Employees	5/21/2023	New
Dufresne, Gary	Contracted Seasonal Employees	5/21/2023	New
Furgal, Charles	Contracted Seasonal Employees	5/21/2023	New/Previously worked as contractor in 2018
Yetman, Kevin	Contracted Seasonal Employees	5/21/2023	New
French, Thomas	Scientists	5/21/2023	Rehire
Skowyra, Tucker	Contracted Seasonal Employees	5/21/2023	New
Castle, Alexander	Contracted Seasonal Employees	5/30/2023	New
Driscoll, Joshua	Contracted Seasonal Employees	6/4/2023	New

Promotions

Name	Title	Date	Comments
McSweeney, Nicole	Asst. Director Outreach & Education-MVI	10/9/2022	From Acting Chief of Information-M V
Hoenig, Amy	Conservation Biologist IV	1/29/2023	From Conservation Biologist III
Gahagan, Joshua	Wildlife Technician III	1/29/2023	From Wildlife Technician II

Internal Transfers and Position Changes

Name	Title	Date	Comment
Echandi, Alexandra	Conservation Biologist III	9/11/2022	Internal Transfer
Leddick, Jesse	Environmental Analyst V	12/4/2022	Internal Transfer
Gabrilska, Leslie Walker	Clerk IV	3/26/2023	Position Type Changed

Employee Terminations

Name	Title	Date	Comments
Baran, Mark	Scientists	7/16/2022	Contract Expired/Rehired May 2023
Boswell, Tara	Conservation Biologist III	6/9/2023	Resignation
Bryant, Jessica	Scientists	7/16/2022	Contract Expired
Cavaliere, Mary D	Program Coordinator II	7/16/2022	Retirement
Comins, Albert	Program Coordinators	12/29/2022	Seasonal Closure
Hubbard, Colleen M	Clerk IV	4/28/2023	Discharge
Liljesthrom, Marcela	Scientists	Blank	Contract Expired/Rehired in FY 2023
Maglio, Meredith	Contracted Seasonal Employees	12/10/2022	Resignation
Mathews, Timothy D	Wildlife Technician III	10/1/2022	Resignation
McKenna, Edward	Program Coordinators	2/11/2023	Seasonal Closure
Naras, Julia Genevieve	Contracted Seasonal Employees	8/23/2022	Contract Expired
Nicolson, Courtney	Conservation Biologist III	5/15/2023	Resignation
Patterson, Chris J	Wildlife Technician II	11/12/2022	Job Abandonment
Regosin, Jonathan V.	Program Manager VIII	3/11/2023	Resignation

9 The Financial Report

Kris McCarthy, Chief Fiscal Officer

George L. Darey Inland Fish and Game Fund

Summary Revenue and Fund Equity

DEPARTMENTAL REVENUES:	FY 2023
Fishing, Hunting, and Trapping Licenses	$ 6,397,586
Archery Stamps	$ 324,431
Primitive Firearm Stamps	$ 328,080
Waterfowl Stamps	$ 96,832
Pheasant Stamps	$ 89,034
Wildlands Stamps	$ 935,330
Trap Registrations	$ 4,364
Antlerless Deer Permits	$ 463,640
Bear Permits	$ 128,525
Turkey Permits	$ 218,040
Special Licenses, Tags and Posters	$ 40,561
Magazine Subscriptions	$ 70,337
Timber Sales, Other	$ 84,613
Fines and Penalties	$ 800
Rents	$ 61,593
Prior Year Refunds	$ -
Donations	$ 24,753
Miscellaneous Income	$ 22,585
PAC	$ 28,676
NSF Charge/Debt. Collection	$ 80
Total	$ 9,319,859

FEDERAL AID REIMBURSEMENTS;	
Dingell-Johnson (Fisheries)	$ 1,719,829
Pittman-Robertson (Wildlife)	$ 7,529,277
Total	$ 9,249,106

TAXES;	
Gasoline Tax Apportionment	$ 902,738

OTHER FINANCIAL SOURCES;	
Reimbursement for Half-Price Licenses	$ 291,717
Reimbursement for free Licenses	$ 1,428,618
Investment Earnings	$ 46,043
Total	$ 1,766,378

TOTAL REVENUE	**$ 21,238,080**

FUND EQUITY AS OF JUNE 30, 2023	**$ 16,215,161**

License and Stamp Sales

Code	Type of License	Cost	Quantity	Amount
F1	CY22 Resident Fishing	$26.00	21,037	$546,962.00
	CY23 Resident Fishing	$29.50	86,262	$2,544,729.00
F2	CY22 Resident Minor Fishing	FREE	1,976	$0.00
	CY23 Resident Minor Fishing	FREE	5,539	$0.00
F3	CY22 Resident Fishing (Age 65-69)	$13.00	1,437	$18,681.00
	CY23 Resident Fishing (Age 65-69)	$14.75	9,779	$144,240.25
F4	CY22 Resident Citizen Fishing (Over 70)	FREE	2,537	$0.00
	CY23 Resident Citizen Fishing (Over 70)	FREE	17,469	$0.00
F4	CY22 Resident Citizen Fishing (Disabled)	FREE	39	$0.00
	CY23 Resident Citizen Fishing (Disabled)	FREE	217	$0.00
F6	CY22 Non-Res. Citizen/Non US Citizen Fishing	$36.00	3,496	$125,856.00
	CY23 Non-Res. Citizen/Non US Citizen Fishing	$39.50	9,465	$373,867.50
F7	CY22 Non-Res. Citizen/Non US Citizen Fishing (3 day)	$20.90	1,990	$41,591.00
	CY23 Non-Res. Citizen/Non US Citizen Fishing (3 day)	$23.30	1,358	$31,641.40
F8	CY22 Resident Fishing (3 day)	$10.00	1,400	$14,000.00
	CY23 Resident Fishing (3 day)	$12.50	807	$10,087.50
F9	CY22 Non-Resident (Citizen) Minor Fishing	$6.80	291	$1,978.80
	CY23 Non-Resident (Citizen) Minor Fishing	$7.10	268	$1,902.80
F10	CY22 Quabbin 1-Day Fishing	$5.00	402	$2,010.00
	CY23 Quabbin 1-Day Fishing	$5.00	2,168	$10,840.00
T1	CY22 Resident Citizen Trapping	$32.00	130	$4,160.00
	CY23 Resident Citizen Trapping	$34.00	628	$21,352.00
T2	CY22 Resident Citizen Minor Trapping	$6.50	11	$71.50
	CY23 Resident Citizen Minor Trapping	$6.50	9	$58.50
T3	CY22 Resident Citizen Trapping (Age 65-69)	$16.00	13	$208.00
	CY23 Resident Citizen Trapping (Age 65-69)	$17.00	74	$1,258.00
	CY22 Trapping non-resident	$203.00	10	$2,030.00
	CY23 Trapping non-resident	$206.00	36	$7,416.00
H1	CY22 Resident Citizen Hunting	$26.00	10,420	$270,920.00
	CY23 Resident Citizen Hunting	$29.50	5,275	$155,612.50
H2	CY22 Resident Citizen Hunting (Age 65-69)	$13.00	715	$9,295.00
	CY23 Resident Citizen Hunting (Age 65-69)	$14.75	644	$9,499.00
H3	CY22 Resident Citizen Hunting (Paraplegics)	FREE	2	$0.00
	CY23 Resident Citizen Hunting (Paraplegics)	FREE	2	$0.00
H4	CY22 Resident Non US Citizen Hunting	$26.00	72	$1,872.00
	CY23 Resident Non US Citizen Hunting	$29.50	76	$2,242.00
H5	CY22 Non-Res. Cit./Non US Citizen Hunting (Big Game)	$98.00	2,626	$257,348.00
	CY23 Non-Res. Cit./Non US Citizen Hunting (Big Game)	$101.50	2,004	$203,406.00
H6	CY22 Non-Res. Cit./Non US Citizen Hunting (Sm. Game)	$64.00	778	$49,792.00

	CY23 Non-Res. Cit./Non US Citizen Hunting (Sm. Game)	$67.50	795	$53,662.50
H8	CY22 Resident (Citizen) Minor Hunting	$6.50	571	$3,711.50
	CY23 Resident (Citizen) Minor Hunting	$6.50	592	$3,848.00
S1	CY22 Resident Citizen Sporting	$47.00	4,325	$203,275.00
	CY23 Resident Citizen Sporting	$54.00	21,480	$1,159,920.00
S2	CY22 Resident Citizen Sporting (Age 65-69)	$23.50	441	$10,363.50
	CY23 Resident Citizen Sporting (Age 65-69)	$27.00	3,636	$98,172.00
S3	CY22 Resident Citizen Sporting (Over 70)	FREE	1,642	$0.00
	CY23 Resident Citizen Sporting (Over 70)	FREE	10,059	$0.00
S4	CY22 Resident Sporting Paraplegic	FREE	13	$0.00
	CY23 Resident Sporting Paraplegic	FREE	64	$0.00
	TOTAL LICENSE SALES (GROSS)		**235,080**	**$6,397,880.25**

Code	**Type of Stamp**	**Cost**	**Quantity**	**Amount**
M1	CY22 Archery Stamps	$10.00	11,039	$110,390.00
	CY23 Archery Stamps	$10.00	20,253	$202,530.00
	CY22 Non-Resident Archery Stamps	$10.00	0	$0.00
	CY23 Non-Resident Archery Stamps	$15.00	768	$11,520.00
M2	CY22 Waterfowl Stamps	$10.00	3,058	$30,580.00
	CY23 Waterfowl Stamps	$10.00	5,421	$54,210.00
	CY22 Non-Resident Waterfowl Stamps	$10.00	0	$0.00
	CY23 Non-Resident Waterfowl Stamps	$15.00	803	$12,045.00
M3	CY22 Primitive Firearm Stamps	$10.00	11,957	$119,570.00
	CY23 Primitive Firearm Stamps	$10.00	19,640	$196,400.00
	CY22 Non-Resident Primitive Firearm Stamps	$10.00	0	$0.00
	CY23 Non-Resident Primitive Firearm Stamps	$15.00	808	$12,120.00
W1	CY22 Wildlands Stamps	$5.00	37,788	$188,940.00
	CY23 Wildlands Stamps	$5.00	126,048	$630,240.00
W2	CY22 Non-Resident Wildlands Stamps	$5.00	9,269	$46,345.00
	CY23 Non-Resident Wildlands Stamps	$5.00	13,961	$69,805.00
	CY22 Pheasant and Quail permit (resident)	$4.00	4,826	$19,304.00
	CY23 Pheasant and Quail permit (resident)	$8.00	7,985	$63,880.00
	CY22 Pheasant and Quail permit (non-resident)	$6.00	469	$2,814.00
	CY23 Pheasant and Quail permit (non-resident)	$12.00	253	$3,036.00
	TOTAL STAMP SALES (GROSS)		**274,346**	**$1,773,729.00**

	Fees Retained and Adjustments by Clerks			-$181.25
	Refunds			-$136.00
	TOTAL			**-$317.25**

	TOTAL LICENSE/STAMP SALES (NET)			**$8,171,292.00**

Expenditures

	FY 2023 TOTAL	%
Administration	$ 1,616,485	
Information-Education	$ 1,195,562	
ISA DCAMM Field Headquarters	$ 178,468	
Total	**$ 2,990,515**	16%

Fisheries and Wildlife Programs:		
Hatcheries	$ 2,865,203	
Game Bird Program	$ 714,276	
Seasonals	$ 28,470	
Cooperative Units	$ 237,834	
Fisheries and Wildlife Management	$ 6,477,992	
Total	**$ 10,323,774**	55%

Other Programs:		
Land Acquisitions	$ 1,058,075	
Waterfowl Management Program	$ 37,128	
Hunter Safety Program	$ 305,237	
Total	**$ 1,400,440**	7%

Other Assessments:		
Payroll Taxes	$ 180,623	
GI and Other Fringe Benefits	$ 3,809,053	
Total	**$ 3,989,676**	21%

TOTAL EXPENDITURES*	**$ 18,704,405**	

Natural Heritage and Endangered Species Fund

Summary Revenue and Fund Equity

REVENUES:	FY 2023
Natural Heritage and Endangered Species Tax Donations	$ 294,653
Sales	$ 3,766
NRCS/Wildlife Habitat Incentives Program (WHIP)	$ 24,231
Section 6	$ 32,332
State Wildlife Grant (SWG)	$ 1,099,213
Bog Turtle	$ -
Massachusetts Endangered Species Act Fees	$ 366,600
Contracts	$ 477,100
Direct Donations	$ 20,022
Interest	$ 4,117
TOTAL REVENUES:	**$ 2,322,033**

EXPENDITURES:	
Natural Heritage and Endangered Species Program	$ 2,651,720
Housatonic Natural Resource Damage	$ 42,284
Total Expenditures	**$ 2,694,003**

FUND EQUITY AS OF JUNE 30, 2023	$ 2,187,883

Other Expenditures

Capital Outlay Funds:	FY 2023
Land Protection: Habitat Management- CR Stewardship	$ 964,789
Staffing for Land and Infrastructure Programs	$ 479,552
Hatchery/District/Westborough Field Headquarters Repairs	$ 60,144
Habitat Grant Program	$ 285,863
Dam Safety and Repair	$ 2,179,170
TOTAL CAPITAL EXPENDITURES	**$ 3,969,518**

Interdepartmental Service Agreements	FY 2023
Massachusetts Highway Department (MassDOT)	$ 125,422.03
Massachusetts Department of Conservation & Recreation	$ 29,105.37
Executive Office of Energy and Environmental Affairs	$ 450,859.19
Total ISA	**$ 605,386.59**

Natural Heritage and Endangered Species Line Item:	**$ 1,412,731.42**

Other Trust Accounts	FY 2023
Federal Electronic Duck Stamp (expenditures)	**$ 183,465.00**
Birch Hill Army Corp of Engineer Trust (ACOE)	**FY 2023**
Revenue	**$ 174,304.00**
Expenditures	**$ -**
ACOE Trust Balance	**$ 174,304.00**

Appendix A The Fisheries Tables and Figures

Table A 1. Environmental variables and watershed characteristics used to predict species and guild presence/absence (from J. Rogers 2023, unpublished manuscript)

Variable	Definition	Source
Latitude	Reported latitude of the fish survey event	
Longitude	Reported longitude of the fish survey event	
Elevation	Mean elevation within the upstream catchment (m)	Hill et al., 2016
Watershed area	Log transformed watershed area at NHDv2 stream segment outlet (km2)	Hill et al., 2016
Summer stream temperature	Mean summer temperature (Jun 1 - Aug 31) averaged over a HUC12 for the year the fish survey occurred	Letcher et al., 2016
Baseflow index	Ratio of the average daily flow during the lowest 7-day flow of the year to the average daily flow during the year overall. Estimates proportion of streamflow from groundwater vs precip (unitless) aligned to the stream reach of the fish survey	USDA Forest Service Office of Sustainability and Climate, 2022
Summer flow	The log of the mean summer (June/July/August) discharge (cfs) aligned to the stream reach of the fish survey	USDA Forest Service Office of Sustainability and Climate, 2022
Low flow date	Average date of the center of the lowest 7-day flow of the year (day of calendar year) aligned to the stream reach of the fish survey	USDA Forest Service Office of Sustainability and Climate, 2022
Number of winter floods	Average number of daily flows between December 1 and March 31 that exceed the 95th percentile of daily flows across the entire year (count) aligned to the stream reach of the fish survey	USDA Forest Service Office of Sustainability and Climate, 2022
Watershed baseflow index	Mean baseflow index within the upstream watershed (unitless)	Hill et al., 2016
Watershed water table depth	Mean of all water table depth values within the upstream watershed (cm)	Hill et al., 2016
Watershed % open water	Upstream watershed areas classified as open. Derived from the nlcd2001.tif (class 11) landscape raster (%)	Hill et al., 2016
Watershed % impervious	% of each 30-m pixel that is composed of impervious anthropogenic materials. Averaged values from the upstream watershed for the years 2001 and 2004, and years 2006, 2008, 2010, 2011, 2013, 2016, 2019.	Hill et al., 2016
Watershed % agriculture	% of the upstream watershed areas classified as pasture/hay land (class 81) or row crop (class 82). Derived from the nlcd2001.tif landscape raster (%)	Hill et al., 2016
Log catchment % open water	The log of the upstream catchment areas classified as open water. Derived from the nlcd2001.tif (class 11) landscape raster (%)	Hill et al., 2016
Catchment % wetland	% of the upstream catchment areas classified as woody wetland (class 90) or herbaceous wetland (class 95). Derived from the nlcd2001.tif landscape raster (%)	Hill et al., 2016
Log catchment road crossings		Hill et al., 2016
Dam density	The number of dams within the HUC12 fish survey location divided by the area of the HUC 12 (dams/km^2)	State dam databases – see text
Dam count	The number of dams within the HUC8 fish survey location (count)	State dam databases – see text

Table A 2. Number of trout produced at each of MassWildlife's five fish hatcheries in FY 2023 (fall 2022 and spring 2023).

Number of Fish							
Species	**Size Category (inches)**	**Bitzer**	**McLaughlin**	**Palmer**	**Sandwich**	**Sunderland**	**Total Number of Fish**
Rainbow Trout	9+	6,600			3,405	2,412	**12,417**
	12+	23,589			28,492	50,766	**102,847**
	14+		187,409		17,474		**204,883**
	Sub-total	**30,189**	**187,409**	**-**	**49,371**	**53,178**	**320,147**
Brook Trout	9+			458	2,975	25,885	**29,318**
	12+	31,100			12,104	5,375	**48,579**
	14+			287			**287**
	18+				319		**319**
	Sub-total	**31,100**	**-**	**745**	**15,398**	**31,260**	**78,503**
Brown Trout	9+	24,000	23,276	506	1,600	34,800	**84,182**
	12+	20,986			8,975	18,150	**48,111**
	14+			160			**160**
	18+			13	804		**817**
	Sub-total	**44,986**	**23,276**	**679**	**11,379**	**52,950**	**133,270**
Tiger Trout	9+				640		**640**
	14+				1,977		**1,977**
	Sub-total				**2,617**		**2,617**
Total		**106,275**	**210,685**	**1,424**	**78,765**	**137,388**	**534,537**

Table A 3. Pounds of trout produced at MassWildlife's five fish hatcheries in FY2023 (fall 2022 and spring 2023).

Weight of Fish in Pounds							
Species	**Size Category (inches)**	**Bitzer**	**McLaughlin**	**Palmer**	**Sandwich**	**Sunderland**	**Total Weight of Fish**
Rainbow Trout	9+	2,869			796	510	**4,175**
	12+	25,676			21,880	35,492	**83,048**
	14+		200,500		12,010		**212,510**
	Sub-total	**28,545**	**200,500**	**-**	**34,686**	**36,002**	**299,733**
Brook Trout	9+			351	640	4,402	**5,393**
	12+	21,614			10,855	3,128	**35,597**
	14+			790			**790**
	18+				582		**582**
	Sub-total	**21,614**	**-**	**1,141**	**12,077**	**7,530**	**42,362**
Brown Trout	9+	7,701	8,320	319	326	8,916	**25,582**
	12+	20,258			9,984	15,038	**45,280**
	14+			544			**544**
	18+			104	2,576		**2,680**
	Sub-total	**27,959**	**8,320**	**967**	**12,886**	**23,954**	**74,086**
Tiger Trout	9+				202		**202**
	14+				1,996		**1,996**
	Sub-total				**2,198**		**2,198**
Total		**78,118**	**208,820**	**2,108**	**61,847**	**67,486**	**418,379**

Table A 4. Summary of landlocked salmon, brook trout eggs, brown trout eggs, and tiger trout eggs produced in FY2023.

Hatchery	Species	Size, in Inches or by Category	Number	Weight (Pounds)
Palmer	Landlocked salmon	9 inches	9,800	2,513
	Landlocked salmon	Fall Fingerlings	3,010	192
	Brook Trout	Eggs	706,660	N/A
	Brown Trout	Eggs	111,807	N/A
Sandwich	Brook Trout	Eggs	159,264	N/A
	Brown Trout	Eggs	427,246	N/A
	Tiger Trout	Eggs	245,728	N/A

Table A 5. Results of fish health tests conducted at the MassWildlife's five fish hatcheries in FY 2023. NEG signifies negative test results.

			Pathogen[1]							
									Protozoa	
Hatchery	Species[2]	Number of Fish Tested	IPNV	VHSV	OMV	IHNV	BF	BRM	WD	Other[3]
Bitzer	BK (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BK (SL)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BT (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (E/A)	60	NEG	NEG	NEG	NEG	NEG	NEG	NEG	
McLaughlin	BT (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (E/A)	60	NEG	NEG	NEG	NEG	NEG	NEG	NEG	
	RT (SH)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BK (SL)	30	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (E/A)	10					NEG	NEG		+CWD
	RT (TL)	10					NEG	NEG		+CWD
	RT (SH)	10					NEG	NEG		+CWD
Palmer	LLS (GL)	60	NEG	NEG	NEG	NEG	NEG	NEG	NEG	
	BK (SA)	15	NEG	NEG	NEG	NEG	NEG	NEG		
	BK (SA)	140[4]	NEG	NEG	NEG	NEG	NEG	NEG		
	BT (SA)	15	NEG	NEG	NEG	NEG	NEG	NEG		
	BT (SA)	88[4]	NEG	NEG	NEG	NEG	NEG	NEG		
Sandwich	BK (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BK (SA)	100[4]	NEG	NEG	NEG	NEG	NEG	NEG		
	BT (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BT (SA)	100[4]	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (E/A)	60	NEG	NEG	NEG	NEG	NEG	NEG	NEG	
	RT (SH)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	TT (SA)	30	NEG	NEG	NEG	NEG	NEG	NEG		
Sunderland	BK (SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	BT(SA)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (E/A)	60	NEG	NEG	NEG	NEG	NEG	NEG		
	RT (SH)	60	NEG	NEG	NEG	NEG	NEG	NEG	NEG	

[1]Fish were tested following the Northeast Fish Health Guidelines and the American Fisheries Society – Fish Health Section "Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens".

IPNV – Pancreatic Necrosis Virus, VHSV – Viral Hemorrhagic Septicemia virus, OMV – *Oncorhynchus masou* virus, IHNV – Infectious Hematopoietic Necrosis virus, BF – *Aeromonas salmonicida,* BRM – *Yersinia ruckeri*, WD – *Myxobolus cerebralis*

[2]Species codes: BK (SA) – brook trout (Sandwich strain), BK (SL) – brook trout (Soda Lake strain), BT (SA) – brown trout (Sandwich strain), RT (E/A) – rainbow trout (Erwin Arlee strain), RT (TL) – rainbow trout (Trout Lodge strain), RT (SH) – rainbow trout (Shasta strain), LLS (GL) – landlocked salmon (Maine Grand Lake strain), TT – tiger trout (Sandwich strain)

[3]Other included examinations and diagnostic tests performed on fish that showed symptoms of a specific disease or parasitic infection. NDT = no addition diagnostic testing necessary; CWD = Coldwater disease caused by the bacteria *Flavobacterium psychrophilum*.

[4]Female ovarian fluid samples

Table A 6. Annual migratory fish counts at the A&D Hydro Dam on the Westfield River from 1992-2022

Date	American Shad	Blueback Herring	Sea Lamprey	Striped Bass	Atlantic Salmon	Gizzard Shad	White Sucker	Small-mouth
*1992					2			
*1993					10			
*1994					7			
*1995					6			
1996	1,413	1	**4,699**	0	19	0	4,699	110
1997	1,012	-	2,255	0	37	0	2,255	64
1998	2,292	2	1,756	5	**47**	1	**5,515**	149
1999	2,668	-	643	0	17	1	1,227	109
2000	3,558	-	2,040	0	11	122	3,158	207
2001	4,720	2	2,345	2	8	0	3,735	129
2002	2,762	4	3,638	2	5	1	2,242	146
2003	1,957	5	404	0	6	0	1,832	155
2004	913	1	1,171	0	12	0	2,789	148
2005	1,237	0	818	0	27	0	1,161	201
2006	1,534	0	1,276	1	34	0	3,447	188
2007	4,497	0	1,797	0	21	0	2,280	133
2008	3,212	0	1,220	0	30	0	1,757	246
2009	1,395	0	538	0	2	0	1,865	260
2010	3,444	4	447	0	3	0	954	185
2011	5,029	0	1,590	0	9	0	1,544	496
2012	**10,373**	3	392	0	6	**176**	1,529	326
2013	4,938	0	729	0	11	0	1,241	620
2014	4,787	4	1,127	0	2	0	1,663	290
2015	3,383	0	218	0	3	0	2,065	341
2016	6,003	0	456	1	1	0	1,023	601
2017	6,004	5	262	1	5	0	2,176	613
2018	5,762	4	138	0	0	0	2,201	363
2019	4,166	5	484	0	0	0	1,822	285
2020	5,567	-	-	-	-	-	-	-
2021	1,962	-	-	-	-	-	-	-
2022	1,297	0	616	1	0	0	824	196

Figure A 1. Daily shad counts at the Westfield River Fish Ladder

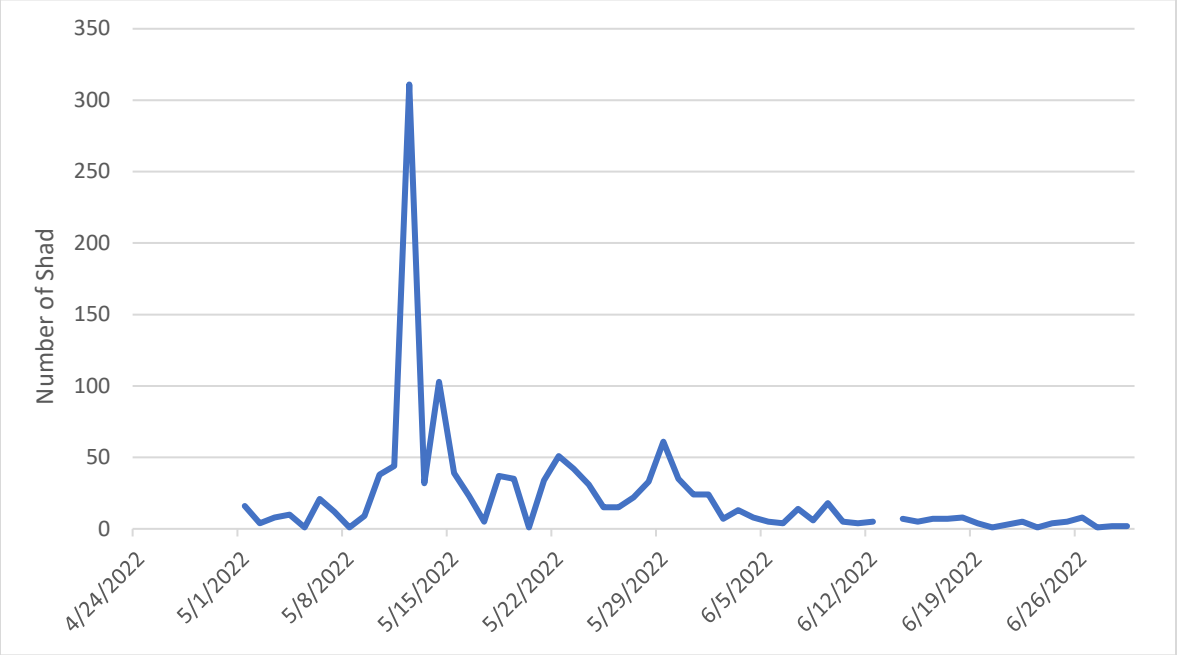
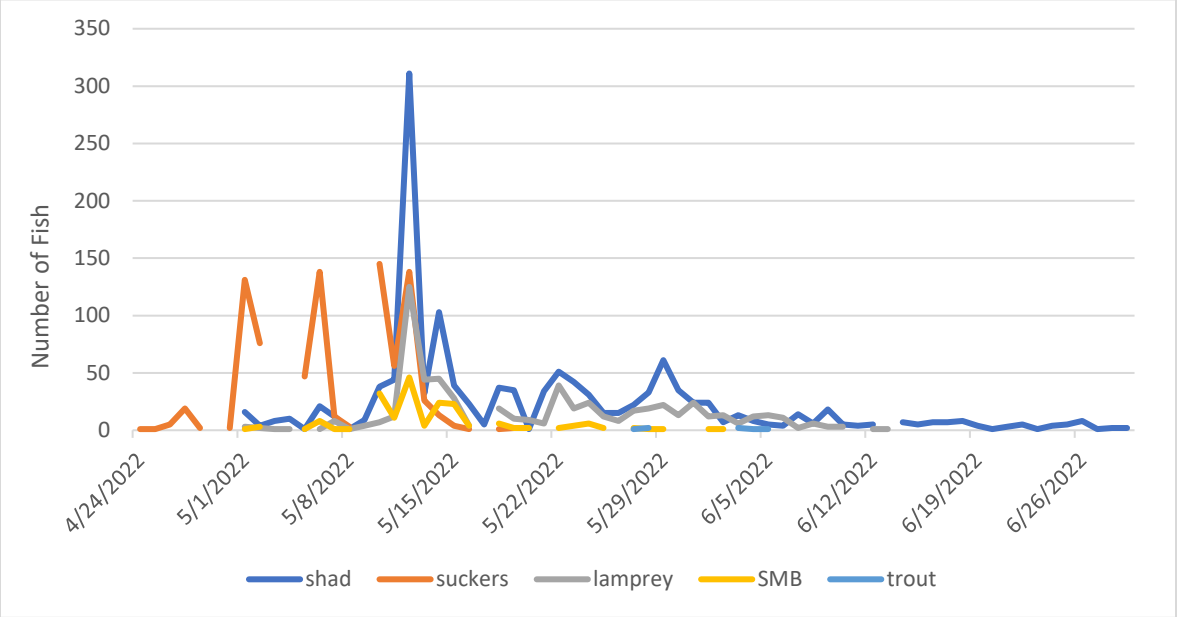


Figure A 2: Westfield River daily fish counts.



Appendix B The Wildlife Tables

Table B 1. FY 2023 biological monitoring sites.

Site Name	Town	Type of Monitoring	Acres
Myles Standish Complex	Plymouth	Forest Inventory	125

Table B 2. FY 2023 summary of habitat management acres, by practice.

Habitat Practice	Acres
Access improvement	2
Field mowing	UNK*
Shrub mowing	209
Prescribed Fire	1,494
Tree Cutting	284
Vegetation control	630
Total	2,619

**A required change in the type of database used to track mowing caused some of the data to be lost or incomplete, so the exact figure in FY 2023 is not known.*

Table B 3. FY 2023 invasive plant control sites.

Site Name	Town	Habitat Type, Vegetation, or Fuels	Acres
Birch Hill ACOE	Templeton	Barrens	5
Birch Hill WMA	Winchendon	Sandplain Grasslands and Heathlands	8
Bitzer Hatchery	Montague	Successional Forests	3
Bullock Ledge WMA	Williamstown	Rock Outcrops, Cliffs, and Talus	4
Burrage Pond WMA	Hanson/Halifax	Marshes and Wet Meadows	25
Coy Hill WMA	Ware/West Brookfield	Oak Forests and Woodlands	1
Erwin S. Wilder WMA	Taunton	Oak Forests and Woodlands	15
Eugene Moran WMA	Windsor	Young Forests	5
Fairfield Brook WMA	Richmond	Calcareous Wetlands	13
Frances A. Crane WMA	Falmouth	Sandplain Grasslands and Heathlands; Oak Forests and Woodlands; Pitch Pine Oak Woodland	240.5
Herman Covey WMA	Belchertown	Sandplain Grasslands and Heathlands	19.5
Leyden WMA	Leyden	Barrens; Cultural Grasslands	37
Mill Brook Bogs WMA	Freetown	Acidic Peatlands	2
Muddy Brook WMA	Hardwick	Oak Forests and Woodlands	163
Quaboag WMA	Brookfield	Sandplain Grasslands and Heathlands	8
Satan's Kingdom WMA	Bernardston	Young Forests; Cultural Grasslands	17
Southwick WMA	Southwick	Sandplain Grasslands and Heathlands	36
Stafford Hill WMA	Cheshire	Young Forests	8
Tully Mountain WMA	Orange	Young Forests	10
Winimusset WMA	New Braintree	Oak Forests and Woodlands	10

Table B 4. FY 2023 shrub mowing management sites.

Site Name	Town	Habitat Type	Acres
Eugene Moran WMA	Windsor	Young Forests	20
Leyden WMA	Leyden	Barrens	16
Montague Plains WMA	Montague	Barrens	74
Satan's Kingdom WMA	Bernardston	Young Forests	25
Southampton WMA	Southampton	Barrens	32
Stafford Hill WMA	Cheshire	Young Forests	16
William Forward WMA	Newbury	Barrens	26

Table B 5. Prescribed burns completed by MassWildlife in FY 2023

Date	Site Name	Vegetation/Fuels	Acres
9/09/2022	Southwick WMA	Sandplain Grassland	21
9/15/2022	Southwick WMA	Sandplain Grassland	06
9/30/2022	Herm Covey WMA	Sandplain Grassland	07
10/21/2022	Montague Plains WMA	Scrub Oak Thicket	22
10/28/2022	Muddy Brook WMA	Sandplain Grassland/Shrubland	22
11/03/2022	Montague Plains WMA	Scrub Oak Thicket	25
11/04/2022	Montague Plains WMA	Pitch Pine and Oak Woodland	52
11/10/2022	Muddy Brook WMA	Oak Woodland and Savannah	135
11/20/2022	Fairfield Brook WMA	Grassland and Calcareous Fen	22
11/21/2022	Karner Brook WMA	Calcareous Fen	06
12/20/2022	Frances Crane WMA – S	Sandplain Grassland and Shrubland	37
12/21/2022	Frances Crane WMA – S	Sandplain Grassland and Shrubland	42
2/07/2023	Muddy Brook WMA	Oak Woodland and Savannah	58
2/13/2023	Southwick WMA	Sandplain Grassland and Shrubland	83
2/14/2023	Southwick WMA	Sandplain Grassland and Shrubland	108
2/27/2023	Herman Covey WMA	Emergent Marsh	1
3/10/2023	Frances Crane WMA – S	Pitch Pine Oak Woodland, Scrub Oak	71
3/20/2023	Frances Crane WMA – N	Sandplain Grassland	116
3/22/2023	Penikese Island Sanctuary	Maritime Grassland	67
3/27/2023	Frances Crane WMA – N	Sandplain Grassland and Scrub Oak	80
4/14/2023	Cuttyhunk Island	Maritime Grassland and Shrubland	07
4/19/2023	Frances Crane WMA – N	Sandplain Grassland and Shrubland	75
4/20/2023	Frances Crane WMA – N	Pitch Pine Oak Woodland and Shrubland	105
4/26/2023	Montague Plains WMA	Pitch Pine Oak Woodland	64
4/28/2023	Bolton Flats WMA	Sandplain Grassland	63
5/09/2023	Leyden WMA	Ridgetop Heathland	15
5/10/2023	Herman Covey WMA	Sandplain Grassland and Shrubland	30
5/11/2023	Leyden WMA	Ridgetop Heathland	16
5/22/2023	Montague Plains WMA	Scrub Oak Thicket	09
5/23/2023	Muddy Brook WMA	Oak Woodland and Savannah	56
5/24/2023	Southeast Pine Barrens WMA	Pitch Pine Woodland/Scrub Oak Thicket	21
6/21/2023	Frances Crane WMA – N	Scrub Oak Thicket	42
6/22/2023	Quaboag WMA	WS Grassland	13
Total burn days: 33	Wildlife Management Areas and Partner Sites: 14	Total acres in FY 2023	1,497

Table B 6. FY 2023 Tree Cutting

Site Name	Town	Habitat Type	Acres
Birch Hill ACOE	Templeton	Barrens	34
Muddy Brook WMA	Hardwick	Oak Forests and Woodlands	35
Myles Standish SF/SE Pine Barrens WMA	Plymouth	Oak Forests and Woodlands, Pitch Pine/Oak Woodlands	215

Table B 7. 2022 Airboat Night-lighting Results

Location	Date	MALL	ABDU	X	WODU	AGWT	BWTE	MISC	Total	P.B.[1]
New Bedford Res	7/27	7			32				39	2
Nashua River	8/1	10			44				54	4
Otter River.	8/2	10			47			1[4]	58	6
Quaboag River	8/3	2			5			1[3]	8	
Lackey Pond	8/12				73				73	5
Housatonic River	8/19		2		64				66	1
Lake Warner	8/24				41				41	1
Turkey Hill Brook	9/21	2			5	2			9	
Lackey Pond	9/23	11	1		45	2		7[2]	66	2
Totals	9 trips	42	3		356	4		9	397	29

[1] *Previously banded*
[2] *sora*
[3] *Virginia rail*
[4] *hooded merganser*

Table B 8. Historical furbearer harvest 1992/1993 to 2022/2023

Season	River Otter [a,d]	Mink [a,d]	Muskrat [b,d]	Beaver [a,d]	Gray Fox [a,c]	Red Fox [a,c]	Weasel [b,c]	Skunk [b,c]	Opossum [b,c]	Raccoon [b,c]	Coyote [a,c]	Bobcat [a,c]	Fisher [a,d]
1992/1993	149	591	9,474	1,086	19	118	0	31	66	2,150	95	10	111
1993/1994	151	593	9,595	1,017	10	92	0	31	54	1,438	92	16	120
1994/1995	165	559	11,341	2,083	19	78	4	52	87	1,471	107	12	158
1995/1996	171	502	7,873	1,135	36	83	15	41	54	640	153	14	226
1996/1997	147	441	7,062	623	20	65	1	11	44	998	166	9	278
1997/1998	13	49	712	98	43	31	5	99	113	559	86	8	340
1998/1999	15	49	1,017	114	54	27	2	64	75	368	97	8	395
1999/2000	11	63	747	312	26	17	1	67	32	123	84	15	220
2000/2001	16	59	667	558	37	27	0	55	24	300	95	14	124
2001/2002	38	49	917	1,172	50	36	0	60	52	399	91	18	197
2002/2003	25	39	649	495	43	24	0	85	27	717	85	23	303
2003/2004	72	25	1,419	717	49	40	0	110	54	720	176	47	215
2004/2005	97	34	1,063	564	37	42	4	111	53	403	191	51	339
2005/2006	119	30	543	791	38	33	7	119	37	178	188	45	342
2006/2007	97	36	679	730	45	46	1	8	25	234	242	38	582
2007/2008	72	40	976	848	33	48	3	25	79	344	530	53	486
2008/2009	64	49	709	702	45	31	0	23	38	239	513	63	521
2009/2010	78	34	1,066	509	46	53	1	15	30	186	599	53	262
2010/2011	79	35	947	548	49	55	6	12	74	237	489	67	321
2011/2012	88	38	1,174	828	38	42	9	15	43	287	449	81	214
2012/2013	156	51	967	711	57	47			3	77	470	103	415
2013/2014	166	60	110	969	65	65	8	8	28	55	420	103	459
2014/2015	102	30	61	562	56	58	1	12	32	26	468	81	398
2015/2016	57	12	518	727	24	27	0	21	16	71	532	79	286

2016/2017	101	8	34	534	56	70	0	15	10	46	486	100	280
2017/2018	62	22	115	667	45	81	1	30	18	59	522	87	244
2018/2019	35	18	32	567	32	126	2	23	20	97	759	109	109
2019/2020	22	17	89	672	50	103	0	39	36	101	626	118	152
2020/2021	30	11	99	594	33	65	2	19	30	82	574	94	118
2021/2022	28	7	17	816	26	63	0	26	17	55	597	97	84
2022/2023	21	5	58	657	27	57	1	24	28	120	724	146	90
Past 5-year Average	27.2	11.6	59	661.2	33.6	82.8	1	26.2	26.2	91	656	112.8	141.4

[a] *number of animals reported at official check stations or via online check system*

[b] *number of animals reported from voluntary trapper survey*

[c] *both hunting and trapping seasons*

[d] *trapping season only*

Appendix C The Wildlife Lands

Table C 1. The Wildlife Lands as of the end of FY 2023.

Central District	***51,350.19***
Ashburnham WMA	272.00
Bare Hill Pond Access	1.45
Benjamin Hill WCE	87.50
Bennett WMA	281.20
Birch Hill WMA	4,560.55
Blackstone / West River Access	28.00
Bolton Flats WMA	1,319.88
Breakneck Brook WCE	526.00
Breakneck Brook WCR	176.00
Breakneck Brook WMA	787.00
Burnshirt River WCE	100.00
Carter Pond WCE	300.50
Chockalog Swamp WMA	52.50
Clinton Bluff WMA	42.00
Coy Hill WMA	1,224.25
Cusky Pond Access	23.00
E. Kent Swift WMA	157.00
Fish Brook WCE	75.00
Fish Brook WMA	324.50
Fitchburg Watershed WCE	1,875.00
Five Mile River Access	178.52
Five Mile River WCR	17.27
Four Chimneys WMA	200.00
Glen Echo Lake Access	1.00
High Ridge WMA	2,240.87
Hitchcock Mountain WCE	110.50
Hitchcock Mountain WCR	499.50
Hitchcock Mountain WMA	268.41
Lackey Pond WMA	174.54
Lawrence Brook WCE	462.60
Lawrence Brook WMA	295.50
Leadmine Mountain WCE	826.37
Leadmine Pond Access	0.05
Leadmine WMA	826.00
Little River WMA	42.00
Long Pond WCE	8.85
Long Pond WMA	5.60
Martha Deering WMA	232.58
McKinstry Brook WCE	31.00
McKinstry Brook WCR	26.00
McKinstry Brook WMA	291.30
Merrill Pond WMA	1,037.06
Millers River WCE	194.22
Millers River WMA	4,019.26
Mine Brook WMA	1,197.40
Moose Brook Access	20.13
Moose Brook WCE	125.00
Moose Brook WMA	849.20
Moose Hill WMA	695.60
Moosehorn Pond Access	9.00
Mossy Pond Access	17.00
Mount Watatic Sanctuary	228.00
Mt. Pisgah WCE	19.12
Mt. Pisgah WMA	88.80
Muddy Brook WCE	575.69
Muddy Brook WMA	1,988.14
Natty Brook Access	95.17
Newton Reservoir WCE	622.00
Nineteenth Hill WCE	623.75
Nineteenth Hill WMA	383.60
Norcross Hill WMA	464.93
North Pond Access	0.18
Oakham WMA	911.20
Phillipston WMA	3,227.37
Popple Camp WMA	1,459.91
Potter Hill WCE	90.80
Poutwater Pond WMA	391.74
Prince River WMA	838.95
Quaboag WMA	1,822.53
Quacumquasit WMA	179.82
Quag Pond Bog Access	31.00
Quinapoxet River Access	32.00

Quinsigamond Marsh Access	60.50
Quinsigamond River Access	18.60
Quisset WCE	247.00
Quisset WMA	424.69
Raccoon Hill WCR	22.00
Raccoon Hill WMA	754.41
Richardson WMA	467.22
Savage Hill WCE	234.00
Savage Hill WMA	930.96
Scripture Hill WMA	121.00
Secret Lake WCE	311.30
Sevenmile River Access	77.00
Slater Woods WCE	73.90
South Meadow Pond Access	0.25
Sputtermill Pond Access	58.50
Stone Bridge WMA	505.17
Stuart Pond WCE	28.70
Sucker Brook WMA	102.60
Susan B. Minns Sanctuary	139.91
Taft Hill WCE	394.60
Thayer Pond WMA	131.00
Tully River Access	1.00
Ware River Access - Barre	40.00
Ware River WMA	185.36
Wayne F. MacCallum WMA	894.58
Webster Lake Access	1.70
Wekepeke WCE	564.00
Whitmanville WCE	118.10
Whortleberry Hill WMA	334.36
Williamsville Pond WCR	5.64
Winchendon Springs WMA	907.74
Winimusset WCE	100.00
Winimusset WMA	670.17
Wolf Swamp WMA	1,233.88
Connecticut Valley District	***32,775.02***
Amethyst Brook WCE	36.90
Bachelor Brook WMA	93.70
Bitzer Fish Hatchery	74.54
Brewer Brook WMA	456.69
Brushy Mountain WCE	78.00
Brushy Mountain WMA	181.38
Catamount WMA	413.00
Chestnut Hill WCE	175.40
Connecticut River Access	94.80
Darwin Scott WMA	27.30
Deerfield River Access	23.00
East Mountain WMA	612.85
Facing Rock WCE	190.00
Facing Rock WMA	1,387.89
Flagg Mountain WCE	345.00
Flagg Mountain WMA	223.69
Forest Lake Access	34.80
Great Swamp WCE	0.94
Great Swamp WMA	750.16
Green River WMA (Valley District)	593.85
Herman Covey WMA	1,505.94
Honey Pot WCE	52.74
Honey Pot WMA	178.42
Lake Lorraine Access	0.26
Lake Quinsigamond Access	6.49
Lake Rohunta Access	2.49
Lake Rohunta WCE	59.00
Lake Warner WMA	98.00
Leyden WMA	759.00
Little Alum Pond Access	0.50
Little Tully Mountain WCE	461.38
Ludlow Reservoir WCE	1,750.00
Mill River Access	14.15
Millers River Access	73.50
Montague Plains WMA	1,983.59
Montague WMA	2,074.45
Mt. Esther WMA	464.18
Mt. Toby WMA	739.10
Mt. Tom WMA	79.90
Orange WCE	877.97
Orange WMA	388.50
Packard Pond Access	0.54
Palmer WMA	1,541.49
Pauchaug Brook WMA	161.30
Paul C. Jones Working Forest WCE	3,486.00
Poland Brook WMA	707.53
Rainbow Beach WMA	45.90

Reed Fish Hatchery	316.00
Satan's Kingdom WCE	123.50
Satan's Kingdom WMA	2,403.77
Sawmill River Access	52.00
Shattuck Brook WMA	178.80
Southampton WMA	170.60
Southwick WCE	61.31
Southwick WMA	348.28
Sunderland Fish Hatchery	45.59
Sunderland Islands WMA	15.00
Tully Brook Access	154.88
Tully Mountain WCE	692.87
Tully Mountain WMA	704.00
Wales WMA	207.15
Walter Cowls Jones Working Forest WCE	2,038.78
Ware River Access	39.00
Warwick WMA	379.00
Wendell WCR	2.39
Wendell WMA	602.78
Westfield River Access	79.40
Westfield WMA	234.03
Whately WMA	388.59
Wilbraham Nature and Cultural Center	143.09
Williamsburg WMA	88.00
Northeast District	***19,476.65***
Ashby WMA	1,136.76
Ayer Game Farm	90.72
Baddacook Pond Access	0.16
Boxborough Station WMA	124.10
Carr Island Sanctuary	110.50
Castle Neck River WMA	54.67
Concord River Access	0.25
Concord River WCE	18.90
Cow Pond Brook WCE	127.00
Crane Pond WMA	2,623.21
Devil's Den WCE	28.00
Dunstable Brook WMA	177.35
Eagle Island WMA	5.00
Elbow Meadow WMA	210.33
Fessenden Hill WMA	21.00
Flagg Swamp WMA	54.00
Flint Pond Access	89.00
Gov. Thos. Dudley Park	4.50
Great Marsh North WCE	426.13
Great Marsh North WMA	459.12
Great Meadows WCE	16.00
Great Swamp Brook WCE	106.00
Groton Town Forest WCE	513.00
Hauk Swamp WMA	61.00
Henry Cabot Lodge Bird Sanctuary (Egg Rock)	2.00
Hunting Hills WCE	84.59
Hunting Hills WMA	430.02
Ipswich River Access	1.79
Ipswich River Access, Peabody	22.23
J. C. Phillips Sanctuary	390.98
King Phillip Woods	87.20
Knops Pond Access	0.60
Lake Attitash Access	6.03
Long Sought For Pond Access	1.00
Martin H. Burns WCE	113.44
Martin H. Burns WMA	1,576.70
Mascuppic Lake Access	0.25
Meadow Pond WCE	81.90
Milk Island Sanctuary	29.00
Mill Creek WCR	59.00
Mount Watatic Reservation	280.00
Mulpus Brook WMA	596.20
Nashua River Access - Dunstable	15.00
Nashua River Access - Groton	10.10
Nashua River Access - Pepperell	11.20
Nashua River Access - Shirley	31.20
Nissitissit River WMA	428.06
Northeast District HQ	15.70
Pantry Brook WMA	449.95
Pepperell Springs WCE	255.00
Ram Island Sanctuary (North)	20.00
Salisbury Salt Marsh WMA	888.65
Squannacook River WCE	348.51
Squannacook River WCR	68.00
Squannacook River WMA	1,919.06

Sucker Brook WCE	12.00
Sudbury River Access	51.86
Surrenden Farm West WCE	169.70
Throne Hill WCE	177.50
Townsend Hill WMA	724.30
Trapfall Brook WMA	45.38
Unkety Brook WCE	137.78
Unkety Brook WMA	830.44
Upper Parker River WMA	208.89
Weymouth Back River Access	16.50
Whittier WMA	42.00
William Forward WCE	274.75
William Forward WMA	1,957.49
Wright Ponds WCE	148.00
Southeast District	***57,433.12***
Acushnet River WCE	30.20
Agawam Mill Pond Access	1.40
Agawam Mill Pond Access WCE	0.50
Agawam River WCE	3.98
Angeline Brook WCE	100.70
Ashby WCE	15.00
Assawompsett Pond Complex WCE	3,065.00
Atwood Reservoir WMA	511.07
Bakers Pond Access	1.75
Barnstable Harbor Access	2.78
Bearse Pond WMA	5.80
Bettys Neck WCE	329.22
Big Sandy Pond Access	0.20
Billingsgate Island Sanctuary	12.00
Billington Sea WCE	69.74
Black Brook WMA	411.32
Blueberry Pond WMA	1.50
Brandt Island Cove WCE	109.52
Brayton Point WMA	2.20
Bread and Cheese Brook WCE	5.52
Burrage Pond WMA	1,842.17
Camp Cachalot WMA	789.00
Camp Edwards WMA	15,013.16
Canoe River WMA	116.60
Chase Garden Creek WMA	56.40
Childs River Access	0.25
Clapps Pond WMA	68.35
Cook Pond Access	3.00
Cooks Pond WMA	69.18
Copicut WCE	486.22
Copicut WMA	3,992.56
Dartmoor Farm WMA	473.00
Dennis Grassy Pond WMA	7.24
Dogfish Bar Beach Access	2.40
Eastham Salt Marsh WMA	7.44
English Salt Marsh WMA	288.50
Erwin S. Wilder WMA	540.95
Fisk Forestdale WMA	235.00
Fox Island WMA	71.10
Frances A. Crane WMA	2,302.31
Gosnold WMA	3.45
Great Herring Pond Access	1.06
Halfway Pond WCE	28.00
Halfway Pond WMA	367.91
Hartley Reservoir WMA	70.00
Haskell Swamp WMA	3,117.22
Head Of The Plains WMA	2.00
Hockomock Swamp WMA	4,748.54
Hog Ponds WMA	24.50
Hyannis Ponds WMA	365.00
Johns Pond Access	0.52
Katama Plains WMA	18.57
Lake Nippenicket WCE	8.35
Lobster Hatchery	14.80
Maple Springs WCE	156.25
Maple Springs WCR	466.24
Maple Springs WMA	858.34
Mashpee Pine Barrens WMA	198.35
Mashpee River WMA	55.80
Mashpee-Wakeby Pond Access	25.00
Mattapoisett River WMA	163.00
Meetinghouse Swamp WMA	123.00
Miacomet Heath WMA	3.83
Mill Brook Bogs WMA	584.52
Muddy Pond WMA	72.00
Nemasket River Access	0.46
Noquochoke WMA	204.50

North Attleborough WMA	36.46
Old Sandwich Game Farm WMA	93.13
Olivers Pond WMA	12.00
Penikese Island Sanctuary	60.00
Peterson Swamp WMA	264.99
Pickerel Cove WCE	78.30
Pickerel Cove WMA	15.90
Pilgrim Springs WCE	17.05
Plymouth Grassy Pond WCR	33.90
Plymouth Grassy Pond WMA	25.50
Plymouth Pine Hill WCE	240.70
Plymouth Town Forest WCE	296.00
Poor Meadow Brook WCE	101.00
Poor Meadow Brook WMA	161.61
Popponesset Beach Access	1.50
Provincetown Corridor WMA	122.00
Puddingstone WMA	158.70
Purchade Brook WMA	106.00
Quashnet River WCE	14.10
Quashnet River WMA	51.54
Quashnet Woods State Reservation and WMA	360.00
Ram Island Sanctuary (South)	2.00
Red Brook WMA	683.20
Robbins Pond Access	1.00
Rocky Gutter WMA	3,318.56
Sandwich Fish Hatchery	69.76
Sandwich Hollows WMA	224.20
Santuit Pond WCE	293.00
Scorton Creek Access	5.48
SE Massachusetts Bioreserve	5.94
SE Pine Barrens WCE	33.04
SE Pine Barrens WMA	796.59
Shubael Pond Access	0.35
Sippican Headwaters WMA	336.73
Sippican Woods WCE	390.14
Sly Pond WMA	192.00
Snipatuit Pond Access	0.50
South Shore Marshes WMA	22.40
South Triangle Pond WCE	47.50
South Triangle Pond WMA	10.26
South Watuppa Pond Access	5.26
Southeast District HQ	29.80
Spectacle Pond Access	0.50
Stump Brook Reservoir WCE	174.00
Tarpaulin Cove Sanctuary	4.50
Taunton River WCE	290.07
Taunton River WCR	4.00
Taunton River WMA	743.22
Tispaquin Pond Access	6.00
Triangle Pond WMA	81.90
Wasque Point WMA	99.50
Watuppa Reservation WCE	4,300.00
West Meadows WMA	231.72
Weweantic River WCE	10.08
Winnetuxet River WMA	44.10
Western District	***69,410.05***
Abbott Brook WCE	1,782.00
Abbott Brook WMA	18.00
Agawam Lake WMA	785.75
Alford Spring WCE	889.82
Allen Mountain WCE	208.00
Ashfield Hawley WMA	284.00
Barton's Ledge WMA	146.60
Boulders WCE	642.53
Brodie Mountain WMA	145.94
Bullock Ledge WMA	15.50
Chalet WMA	7,804.33
Cold Brook WCE	405.00
Cole Meadow WCE	101.00
Cummington WMA	415.80
Day Mountain WMA	387.54
Deerfield River Access, Charlemont	0.62
Dolomite Ledges WMA	389.87
E. Howe Forbush Sanctuary	365.50
Elizabeth's Woods WCE	86.00
Eugene D. Moran WMA	1,870.43
Fairfield Brook WMA	164.90
Farmington River WMA	1,901.10
Fisk Meadows WMA	638.17
Flag Rock WCE	41.38
Flat Brook WMA	273.15
Fox Den WMA	5,707.37

George L. Darey Housatonic Valley WMA	812.93
Grace A. Robson Sanctuary	62.00
Green River WMA (Western District)	489.12
Hawks Brook WCE	23.19
Hawks Brook WMA	509.83
Hinsdale Flats WMA	1,940.63
Hiram H. Fox WMA	3,781.19
Hoosic River Access	5.90
Hop Brook WMA	527.53
Housatonic River Access	17.00
Housatonic River East Branch WCE	123.83
Housatonic River East Branch WMA	27.50
Hubbard Brook WMA	195.93
Jackson Swamp WCE	175.46
John J. Kelly WMA	342.00
Jug End State Reservation and WMA	1,169.80
Jug End WCE	262.48
Kampoosa Fen WMA	72.00
Karner Brook WCE	81.57
Karner Brook WMA	265.97
Knightville WCE	676.00
Konkapot River Access	16.40
Lilly Pond WMA	395.70
Long Mountain WMA	1,014.46
Maple Hill WMA	687.99
Maxwell Brook WMA	168.19
Meadow Brook WCE	126.04
Meadow Brook WMA	50.00
Misery Mountain WMA	1,416.39
Mt. Darby WCE	319.29
Mt. Plantain WCE	1,337.44
North Egremont WCE	21.50
North Egremont WMA	25.96
North River West Branch WCE	250.20
Oak Hill WMA	712.30
Peru WMA	5,143.47
Powell Brook WMA	404.58
Ram Hill WMA	549.60
Richmond Fen WMA	22.90
Rockhouse Mountain WCE	78.00
Savoy WMA	1,985.37
Scout Pond WCE	175.90
Shales Brook WCE	5.60
Shales Brook WMA	234.00
Shaw Brook WMA	153.33
Silver Brook WCE	162.00
Soda Creek WCE	301.58
Stafford Hill WMA	904.60
Stage Brook WCE	581.00
Stage Brook WMA	148.30
Steadman Pond WCE	1,716.17
Swift River WMA	867.46
Tekoa Mountain WMA	1,383.30
Thorpe Brook WCE	266.20
Three Mile Pond WMA	1,141.82
Tom Ball Mountain WCE	849.53
Tower Brook WMA	789.61
Tracy Pond WMA	323.12
Umpachene River WCE	239.00
Upper Westfield River WMA	328.72
Walnut Hill WMA	1,116.70
Western District (Old HQ)	2.35
Westfield River Access, Chester	3.50
Westfield Watershed WCE	2,300.00
Widow White's Peak WCE	244.00
Williams River WMA	60.50
Windsor Brook WCE	3,284.43
Windsor Brook WCR	69.40
Grand Total as of June 30, 2023	**230,445.03**