Annual Report 2016

Massachusetts Division of Fisheries & Wildlife

On Saturday June 4, 2016, MassWildlife celebrated its 150th anniversary with an open house at the new Field Headquarters in Westborough. The event featured interactive displays, demonstrations, kids crafts, guided nature walks, live animals, and hands-on activities like archery, casting, and simulated target shooting, plus cake and a BBQ, and was attended by 1,000 people!

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Mr. George L. Darey, Chairperson of the Fisheries & Wildlife Board, addresses a large crowd at MassWildlife's 150th anniversary open house held at the division's new field headquarters in Westborough.
Photo by Troy Gipps/MassWildlife

Back Cover:
Participants in MassWildlife's 150th anniversary open house. Photos by Bill Byrne and Troy Gipps

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The Board Reports

George L. Darey
Chairperson

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 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 operations of the Massachusetts Division of Fisheries and Wildlife, reviews the agency's programs, and sets policy and regulations pertinent to wildlife in the Commonwealth.

The Board has continued its tradition this year of holding monthly meetings at locations around the state, holding public hearings on proposed regulatory changes, and addressing many issues of specific concern. 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 and of agency programs.

The year 2016 marked the 150th anniversary of MassWildlife, and a number of presentations to the Board kept us apprised of the preparations being made and the numerous public events planned and presented by staff throughout the year to celebrate the grand occasion. All of these culminated in an open house in early June at the new Field Headquarters, the Richard Cronin Building, attended by approximately 2,000 people of all ages and backgrounds. The entire staff present did a tremendous job explaining their jobs, talking about species and habitats in the state, demonstrating equipment, and answering thousands of questions all day. I believe this event was the greatest I have participated in over my entire tenure with the Fisheries and Wildlife Board, and I could not have been prouder of the agency and its hard-working employees.

The issue of Managers' pay compression, long an important priority of the Fisheries and Wildlife Board as a major impediment to keeping high-quality staff and encouraging the promotion of section heads from within our own ranks, was finally resolved in FY 2016 with across-the-board upgrades in Managers' pay scales. This is a very welcome change, putting MassWildlife's manager pay on a par with comparable management levels in other scientific state agencies, and the Board members congratulate and thank Director Jack Buckley and DFG Human Resources Officer Johanna Zabriskie for their hard work and leadership in getting this long-standing inequity resolved.

Administrative Matters

Updated Agency Seal

During the November meeting, Director Buckley asked the Board to update the MassWildlife Seal, and the Board members approved it during the meeting. The change only involved adding the phrase "Est. 1866" to the body of the seal, meant to commemorate the agency's 150th anniversary.

Access Fees at Trout-stocked Waters Policy

In 2010, Chief of Hatcheries Ken Simmons developed criteria for stocking waters in the Commonwealth: there must be suitable public access, suitable habitat and water chemistry, and the water must contribute to the goals of the program of increasing and enhancing recreational angling opportunities. Barriers to access can take several forms, and excessive fees charged at lakes and ponds result in angler complaints that required individual assessments of the given fee structure by MassWildlife personnel. Site-by-site assessments are time consuming and can be inconsistent, so the agency developed a policy on fees at trout-stocked lakes and ponds.

Fees can vary widely across the state. The Office of Fishing and Boating Access (OFBA) and the DCR both have a fee of up to $8 per day, while town lakes can charge much more, and charge different fees for town residents and town nonresidents.

The policy was unanimously adopted by the Board, and

only applies to waterbodies that have fee-only access all year (some towns only charge for part of the year). The fee structure that must obtain at stocked sites is as follows:
A daily fee must be available, and it must be consistent with DCR and OFBA access rates (currently $8).

If there is an annual fee, any town nonresident increase must be waived for licensed anglers, and it cannot be charged on top of a daily fee.

Adequate signage and contact information must be provided by the managing authority (i.e., the municipality)
Trout will not be stocked in the waterbody unless the criteria are met.

Potential Agreement with the Ruffed Grouse Society

At the March meeting, Upland Game Biologist David Scarpitti reported on the Division's draft Memorandum of Understanding (MOU) with the Ruffed Grouse Society, which will establish a cooperative effort to create, maintain, and conduct public outreach to promote understanding of the benefits and importance of early-successional habitat (ESH) in Massachusetts.

Specific highlights of the MOU include that it is very similar to the agency's MOU with the National Wild Turkey Federation, which calls for a joint effort to continue the promotion of hunting and the state's hunting heritage; technical assistance for landowners, industry, and field staff interested in creating ESH on their properties; the creation and maintenance of demonstration areas; project funding; and outreach education on the benefits of ESH for many species, including Massachusetts SWAP species. At the close of the fiscal year, MassWildlife's draft of the MOU is being reviewed by the Ruffed Grouse Society.

The U.S. Fish and Wildlife Service's Proposed Great Thicket National Wildlife Refuge

A subcommittee of the Board met with Director Buckley and MassWildlife staff to discuss the U.S. Fish and Wildlife Service's proposal to create a national wildlife refuge in Southeastern Massachusetts, in the area where MassWildlife has spent a great deal of time and money protecting wildlife habitat. The importance of public access to MassWildlife lands; the agency's continued ability to manage wildlife, including through regulated hunting and trapping; and the protection of state species in the context of the USFWS's proposal were all topics discussed at the meeting, which took place in March.

In Massachusetts, all public and private land is impacted by the state's endangered species act, and it was decided that MassWildlife needs to work out an agreement whereby, for example, Massachusetts listed species receive the same kind of protection whether they are on private or public land. With staff's help providing details, a letter from the Director to the Region 5 Director of the U.S. Fish and Wildlife Service in Hadley was produced that included detailed comments on the proposal reflecting the agency's and the Board's concerns.

Board Elections

The Board normally conducts its annual election of officers at the October meeting each year. Secretary Roche took over the meeting from the Chairman and opened the elections. George Darey was reelected to the office of Chairman, John Creedon was reelected Vice Chair, and Michael Roche was reelected Secretary.

Branding of the Massachusetts Division of Fisheries and Wildlife

Outreach and Marketing Specialist Nicole DeAngelis coordinated the Division's consultations with a design firm to brand MassWildlife with consistent graphics and colors, to unify all the different documents, brochures, and booklets the agency produces, as part of a larger branding and outreach effort that is being rolled out over time. The final result, after Board input, is being disseminated throughout the agency's publications, including this Annual Report.

Open Meeting Law Review

Richard Lehan, General Counsel to the DFG, presented the Board with a comprehensive review of the Open Meeting Law as it applies to state public bodies at the June meeting, as the Chairman had requested during the previous monthly meeting.

Proposed Wildlife Lands Policy and Walking Trails Policy

Chief of Wildlife Lands Craig MacDonnell led a discussion of two draft policies submitted for Board review and approval, a Wildlife Lands Policy and a Walking Trails Policy, at the June meeting. The Board discussion followed several meetings of Senior Staff during the previous eight months, and the question of whether and to what extent MassWildlife should consider this issue arose from three circumstances: 1) a growing sense of increased pressure on WMAs for trail usage; 2) an actual increase in the number of requests for trail construction; and 3) a number of situations where trails advocates have seemed to be overreaching; examples of which were reviewed for the Board.

Mr. MacDonnell's presentation provided a brief opening

orientation to the trails situation on MassWildlife lands, a review from the District Managers of what trails exist on our WMAs, a review of the results of a survey of Northeast Association of Fish and Wildlife Agencies states regarding land-use issues, a review of trails impacts on wildlife from the Wildlife Section, and a discussion of the policy proposal agreed upon by Senior Staff.

The proposed Wildlife Lands Policy is the more general statement of the agency's position regarding how MassWildlife's lands should be utilized. MassWildlife has a statutory mandate to provide both biological protection and management while also providing wildlife-dependent recreational opportunities. The Wildlife Lands Policy starts with a primary rule that relates to MassWildlife's two-part statutory mandate, which is that MassWildlife shall measure management decisions "in terms of consistency with the statutory mandates of protecting wildlife resources [and] managing and providing wildlife-dependent recreational opportunities, including hunting, fishing, and trapping." Next, it observes that protecting land is necessary to meet MassWildlife's statutory obligations to do both things and that we've conserved a healthy but relatively small number of acres across the state in comparison to the total area of the state. The proposed policy suggests that MassWildlife must be very careful in how it manages this acreage and that it must guard those acres against a rapidly growing demand for activities that are contrary to our mission by making management decisions that are consistent with our statutory mandate. In implementing that primary rule, MassWildlife must specifically observe more specific standards of a secondary rule: to "1) maintain WMAs and Access Areas as wild and undeveloped places to the greatest extent feasible consistent with the habitat management goals established by the [Board]; (2) encourage stewardship that advances this standard; and (3) discourage activities that compromise this standard.

The second policy proposed, the MassWildlife Walking Trails Policy, nests the Wildlife Lands policy within it. He explained that the basic rule of this policy discourages trails as inconsistent with our mission, with a general exception for connectivity of existing major walking trails, and a narrow exception in discretion of the Director and Board, to allow flexibility for future unforeseen circumstances.

After an extended discussion, Deputy Director Tisa asked the Board members for specific edits for staff to analyze and incorporate. The drafting process was ongoing at the close of the fiscal year.

Adopted Regulations and Other Votes of the Board

Blue Hills Reservation Antlerless Deer Permit Allocation Process

At the July meeting, Assistant Director for Wildlife John O'Leary reported that Masswildlife assisted with deer surveys and was assisting with drafting the management plan for the Blue Hills Reservation. Staff had determined that we needed to provide additional antlerless deer permits for the reservation, and the agency already does this with the DCR Quabbin Hunt. As is the case with the Quabbin hunt, the DCR performs the hunter selection, it is the online agent that enables each accepted customer ID, and the validated hunters can then purchase their permits, which are outside of the WMZ allocation. The actual allocation was determined when the scope of the hunt was determined.

Director Buckley pointed out that this area is an example of the urban-suburban interface where we need to be more aggressive, adding that the agency had a workshop scheduled by Wildlife Technician Susan (née Ingalls) McCarthy later that week on the general topic of suburban deer. Assistant Director O'Leary pointed out that, in the Blue Hills, 18-20 deer per square mile is the ideal; at the time there were better than 90 per square mile, and that the Blue Hills Reservation is inside Boston, inside Route 128. It is hoped that the positive experience will show the way to other towns and conservation areas with similar densities.

In October, Assistant Director for Wildlife O'Leary presented the Board with further information regarding the agency's work with the DCR in developing the Blue Hills Draft Deer Management Plan and with the public meetings where the DCR solicited comments on the draft plan. In 2013, the Division had conducted a distance-sampling effort to develop an estimate of deer density in the Blue Hills Reservation, and the Moose and Deer Project Leader presented these results to DCR officials and the public during the year. At the public meetings for the draft plan, either the Assistant Director of Wildlife or the Moose and Deer Project Leader presented the various deer management options to the public at three meetings (September 24 and 29 and October 1), including the preferred option of a controlled, shotgun-only hunt using licensed hunters. This was the result of many meetings with the DCR and other local stakeholders over the previous several months. The hunt was scheduled to take place on the Mondays and Tuesdays of the two-week shotgun season.

At the December meeting, Deer and Moose Project Leader Stainbrook reported that the Blue Hills Reservation hunt had been set up like the Quabbin hunt. He reported that, due in part to careful planning and execution, it was safely conducted in an urban area, with no incidents. There were no injuries, and it is a great example of what can be done to bring effective deer management to areas where hunting has been previously excluded. He also reported that the de-

tails of the organization and objectives of the hunt were in the DCR's management plan on its website.

Mr. Stainbrook reported that a maximum of 96 hunters could have been issued permits for each of two segments of the hunt, which required that each hunter participate in an orientation. The hunt was conducted in two segments, with hunters permitted to go out both days; Segment 1 was held Monday, November 30, and Tuesday, December 1; Segment 2 on Monday, December 7, and Tuesday, December 8. The first week, 85 hunters participated and took 41 deer, which translates to a 51% success rate. The following week 51 participants took 23 deer, which yielded a 45% success rate. In total, 64 deer were harvested in the 4 days. The reservation is split into management zones, and 4.5 square miles of the total 10-square-mile property were open to hunting. Mr. Stainbrook reported that the total harvest represented a reduction of 14 deer per square mile of forest in the managed areas. He also stressed that the total number included 47 females, which equates to 120 fewer deer in the coming spring.

In the brief discussion that ensued, Mr. Stainbrook was asked about the political reaction to the hunt, and whether there was a lot of resistance. He replied that the DCR and MassWildlife put the detailed management plan out for the public ahead of time, and representatives from both agencies spent a lot of time explaining the reasons for the hunt and the methods that would be employed. He added that the public was very ready for something to be done in the area, and that there were many people, including especially very local people, who were in support of management.

2015—2016 and 2016—2017 Migratory Game Bird Seasons

Waterfowl Biologist H Heusmann presented the 2015 Waterfowl Report and submitted the proposed 2015-2016 Migratory Game Bird seasons and method of take at the August meeting, as usual. The details of both the federal frameworks and the adopted Massachusetts regulations will be found in the Wildlife Section report, below.

In October, Mr. Heusmann returned to the Board with an update of the waterfowl seasons, reporting that the federal frameworks for the 2016-17 seasons were being developed at that time. The timeline of the new frameworks model at the federal level is to have one meeting and one determination of the federal frameworks, in February, so there will be no need for a July federal meeting and no last-minute rush to develop the Massachusetts frameworks for the fall seasons.

Mr. Heusmann also reported that a big issue right now is sea ducks: there is a concern that they are being overharvested, particularly eiders. He stated that there is a proposed reduction of season length and bag limits, and that it is also possible that the sea duck special season will be eliminated, that it will become part of the regular duck season.

Because of the change in the federal schedule for the frameworks, the 2016-2017 Waterfowl Hunting Seasons were proposed in February, as Mr. Heusmann had advised the Board. Assistant Director for Wildlife Laura Conlee introduced Upland Biologist David Scarpitti, who began by presenting the Board with the federal frameworks for migratory bird hunting in 2016-2017. He stated that there is a new combined early and late hunting season federal regulations cycle, of which Mr. Heusmann had notified the Board in previous years. The proposed season frameworks were published in the December 10, 2015, Federal Register with a 30-day comment period, and the final season frameworks were published in the February 25, 2016, Federal Register. Mr. Scarpitti reported that, under this new schedule, states are to submit their seasons selections by April 30 for publication in the June 1 Federal Register this year.

Special seasons and zones are used in cases where populations are overabundant, underutilized, or invasive. Originally, sea ducks were considered under-harvested because few waterfowlers hunted them. But, in 2008, nearly one-third of Massachusetts waterfowlers hunted specifically for sea ducks. The USFWS's analysis was that production is not sufficient to offset mortality. So, while total harvest is low, a reduction in harvest levels is needed to stabilize populations. To that end, the USFWS is initially seeking to achieve a 25% reduction in harvest.

The public hearing to establish rules and regulations relative to the 2016-2017 Migratory Game Bird seasons and method of take was held immediately after Mr. Scarpitti's presentation, and the Board voted unanimously to adopt staff recommendations as presented; the details can be found in the Wildlife Section report, below.

Final Approval of the State Wildlife Action Plan

Assistant Director for Wildlife John O'Leary had come to the Board in June of the previous fiscal year when the draft State Wildlife Action Plan (SWAP) was completed to ask its approval to put the plan out to the public for comment, which staff then did. MassWildlife received many comments from NGOs and environmental organizations and took them into account in the final document. The Board unanimously approved the final SWAP in September.

The document is somewhat different from the previous SWAP: climate change is more important, and staff added notes detailing accomplishments since the 2005 edition. Staff had removed some species, and there are 570 species included in the 2015 edition, including plants, which don't get funding but are an important component of hab-

itat and conservation needs. The Assistant Director offered his thanks and commendation to NHESP Habitat Protection Specialist Lynn Harper, who did most of the planning and coordinating of the project among the many staff who contributed, and also to all the other MassWildlife professionals who contributed their time and expertise to the effort.
2015 Deer Review / 2016 Antlerless Deer Permit Allocation Recommendations.

At the May meeting, Deer and Moose Project Leader David Stainbrook began his report by briefly explaining how the MassWildlife manages deer in Massachusetts. He reported that the first part of our statewide deer management goal is to maintain deer in good physical condition, with a balanced age and sex structure. The main part of our statewide deer management goal is to ensure that deer numbers are below the point that can have major impacts to the forest, and to other species that our agency is responsible for managing (game species like ruffed grouse and non-game species such as wood thrushes, which rely on a healthy understory for nesting success). The literature suggests that this is achieved at densities below approximately 20 deer per square mile of forest (in Northeastern Forests). The last part is to balance social desires and tolerance of deer, which research shows can be 6-18 deer per square mile of forest. In sum, he said that the MassWildlife wants enough deer on the landscape for hunters and nature enthusiasts to enjoy, while minimizing concerns of public safety, public health, and agricultural and residential property damage.

He then reviewed and expanded upon the results of Massachusetts' first-ever Youth Deer Hunt, which had been held on Saturday, October 3, 2015 (first reported on by Wildlife Biologist Trina Moruzzi at the October meeting previous). The agency had issued 1,339 Youth Hunt permits, 757 to 12-14-year-olds and 582 to 15-17-year-olds. The total harvest was 143 deer, with 54 antlered and 89 antlerless. This represents a 10% success rate based on the number of permits sold, but Mr. Stainbrook noted that we don't know the number of youth that actually hunted that day, nor where they hunted, and reported that staff will be asking those two questions to provide reliable data to track youth effort by zone when the 2016 Youth hunt permit is issued (August 1—October 1). Based on the preliminary results of the 2015 Hunter Survey, Mr. Stainbrook reported that 55% of youth saw at least one deer and that the number of youth deer hunters may increase to just over 2,000 for 2016. He noted that we need to make sure that the female deer harvest does not impact management goals in future years. But he reported that female harvest by youth in 2015 did not appear to impact the agency's management goals, and the projected increase this year is not expected to do so. He also reported that, for 2016, the staff proposed to again allow youth to take an antlered or antlerless deer in any zone, and will continue to monitor female harvest each year.
Mr. Stainbrook reported that he had left last year's Deer Review Board meeting with a promise to do an in-depth analysis of the impacts on deer of the historic winter of 2014. We had very deep snow for a long period of time in much of the state (Worcester County eastward) in 2014. Staff was still getting questions about how many deer died from starvation and how much it impacted deer numbers, especially considering the drop in harvest in 2015. Mr. Stainbrook observed that we know that deer have been dealing with harsh winters for thousands of years here in Massachusetts, and a harsh winter may be too much to handle for a sick or injured deer that might have been able to survive a mild winter, but that we did not expect to find evidence of significant impacts to the overall deer population.

He went on to state that one of the easiest ways to verify starvation is to look at the bone marrow in the femur. It is one of the last places for fat storage, and below about 20% fat content typically indicates starvation. Part of this question was answered at last year's deer review: Mr. Stainbrook reminded the Board that we did not see any significant indication of starvation (staff looked in historical wintering areas and attempted to verify any reports received). He reported that there were a few documented cases of starvation and some unconfirmed reports, mostly from areas closed to hunting with high deer numbers and over-browsed habitat. Now that staff has the biological data from the 2015 season, we have actual data on a large scale to better understand the impacts it may have had on deer numbers. A further analysis did not suggest any significant impacts to deer: 1) no significant evidence of direct mortality of fawns, that is, no large drop in the proportion of yearlings (1.5 years old) in the 2015 harvest; 2) no evidence of indirect impacts: no large drop in yearling male antler beam diameter (still well above the 15-mm threshold level that indicates stress), and no large drop in the proportion of yearlings in the 2015 antlerless harvest: Staff looked at whether actual reproduction was impacted. If females had fewer fawns or if they were less likely to survive, we would see a large drop in the proportion of fawns in the 2015 antlerless harvest, and we did not.

Next Mr. Stainbrook turned to a discussion of the trends in Western and Central Massachusetts, with a special focus on WMZ 6 and the Quabbin Reservation, which is owned and managed by DCR and is a successful example of using regulated hunting to bring deer numbers from a very high level to ecologically sustainable levels needed for forest regeneration and water quality. Deer numbers were well above statewide goals in the Quabbin and in the surrounding WMZ 6 prior to the hunt (pre-1991). The Quabbin lands are centered within WMZ 6 and about 1/3 of its total area. Now that DCR is meeting regeneration goals for water quality, deer

numbers can be adjusted and brought into alignment with the MassWildlife's management range for the surrounding area. WMZ 6 is at the lower end of the management range and some of the Quabbin hunting zones are below the management range of 12-18 deer per square mile of forest. Mr. Stainbrook reported that this requires that antlerless permits not be issued to every hunter, but allocated based on harvest data and trends on an annual basis.

Mr. Stainbrook stated that MassWildlife and DCR worked together on the decision process to bring the two areas into alignment with our management range of 12-18 deer per square mile of forest. They analyzed the harvest data for the Quabbin with MassWildlife's statewide model to come up with a permit allocation of 500 antlerless deer permits, which is approximately a 38% reduction from an average of about 800 permits given out in previous years. Mr. Stainbrook also pointed out that Dan Clark and Ken MacKenzie, both with DCR's Natural Resources Section, were present to answer any questions specific to the Quabbin that Board members may have at the end of the presentation.
The Deer and Moose Project Leader also discussed the trends in Eastern Massachusetts, and provided a summary of the results of the 2015 controlled hunt in the Blue Hills Reservation, where 64 deer (47 female) were removed. He reported that the hunt demonstrated that regulated hunting and firearms can be used to safely manage deer in urban/suburban areas, and that MassWildlife staff is still in regular communication with DCR regarding refinements for the 2016 hunt, adding that the hunt was set up as a multi-year approach, with the first year being conservative.
After some questions and discussion by the Board, and in closing, Mr. Stainbrook presented the proposed antlerless deer permit allocations for the 2016 deer-hunting season for the Board's approval (found in the Wildlife section of this report). Mr. Stainbrook also noted that the Youth permit numbers would be unchanged.

Director Buckley stated that one thing he had learned from Mr. Stainbrook's presentation is that it is very encouraging that we could have enough youth out there hunting that they can start potentially impacting deer numbers; this is an excellent development.

At the close of Mr. Stainbrook's presentation, the Board voted unanimously to accept of all the staff recommendations.

Proposals for New, Updated, or Amended Regulations

Proposed Dog Regulations on WMAs

At the August meeting, Southeast Wildlife District Supervisor Jason Zimmer detailed the agency process he had recently led to systematically explore the issues surrounding the increasing numbers of individuals and pet-sitting businesses walking dogs on Wildlife Management Areas (WMA). Mr. Zimmer's extensive review started with the restatement of the mission of the Division, detailed its increasing land-management role in the state, enumerated the recreational uses of WMAs, discussed the various people (or user-groups) who use WMAs with dogs, listed the impacts on WMAs and wildlife associated with dog-walking, provided a review of the existing regulations and agency policies that relate to dog-walking as well as a literature review of what is being done in other states and on other properties open to the public, and then presented a proposed regulation that had been drafted in cooperation with his fellow District Supervisors to attempt to address some of the escalating problems.

After some discussion, Secretary Roche moved that the process be started to put the proposed regulation out for a public hearing; Dr. Larson seconded the motion, and it passed unanimously. Chairman Darey stated that a Board subcommittee could be formed with Dr. Van Roo and Secretary Roche, to advise staff as the regulation is presented to a hearing, and Director Buckley agreed that the audience would be different and would warrant a shorter presentation.

Executive Order 562

In September, Regulations Specialist James Burnham reported that MassWildlife was charged by Executive Order 562, which the Governor signed on March 31, 2015, with reviewing every regulation published in the Code of Massachusetts Regulations. For every regulation, MassWildlife needed to recommend keeping the regulation in its current form, modifying/amending it, or rescinding it.

Mr. Burnham explained that each agency in the Executive Branch had to hold a public listening session where the public was invited to comment on the agency's regulations and state whether the regulation(s) should be unchanged, modified/amended or rescinded. He also reported that each agency was required to create a work plan that will have any modifications/amendments or rescissions of regulations promulgated by March 31, 2016, and noted that Executive Order 562 remains in effect until that date.

The staff's proposed work plan, including the approvals that had to be received from EEA and ANF prior to submission to the Secretary of the Commonwealth, ran from October 2015 through March 2016, targeting March 25, 2016, as the anticipated promulgation date of the changes. Mr. Burnham reported that he and other staff had identified several areas in our regulations that were no longer useful, and suggested changes to those at the same time, but he explained that

the agency had to wait until after the listening process to do so.

Mr. Burnham returned to the Board in November with the next step, the Proposed Regulatory Changes under Executive Order 562. He reviewed the charge to executive departments in Executive Order 562, then presented in detail and explained the Division's proposals for its regulations:

Retain:
321 CMR 4.00: Fishing
321 CMR 5.00: Coldwater Fish Resources
321 CMR 7.00: Wildlife Sanctuaries
321 CMR 9.00: Exotic Wildlife
321 CMR 11.00: Nature Preserves
Amend:
321 CMR 2.00: Miscellaneous Regulations Relating to Fisheries and Wildlife
321 CMR 3.00: Hunting

For these two regulations, the proposed amendments are technical in nature. Examples of proposed changes: "Department of Food and Agriculture" to "Department of Agricultural Resources" and "Executive Office of Environmental Affairs" to the "Executive Office of Energy and Environmental Affairs," etc.

321 CMR 10.00: Massachusetts Endangered Species Act
This regulation amendment has been in process. Mr. Burnham reported that staff is not proposing any additional alterations to the final draft, which the Board had approved on January 15, 2015, as part of the E.O. 562 review process.
Rescind:

321 CMR 6.00: Dog Restraining Order
This regulation was enacted at a time when the deer herd was small in the Commonwealth and there were some cases of and much concern about dogs running and otherwise harassing deer. This situation no longer pertains. This regulation gets its authority from the Powers of the Director section of the General Laws, and therefore can always be reenacted if it becomes necessary.

321 CMR 8.00: Endangered Wildlife and Plants
This regulation is merely a pointer to the main regulation at 321 CMR 10.00, and as such could be eliminated.

At the November meeting, the Board instructed staff to put the proposal out to a public hearing and open it to public comment as soon as approval was received from EEA and ANF.

In January, another regulation was identified and brought to the Board that was proposed to be eliminated in the E.O. 562 process, which was still ongoing: a fishing regulation that provided a grandfathered period that expired no later than at the end of calendar year 2014:

321 CMR 4.00: Fishing

4.09: Propagation, Culture, Maintenance and Sale of Protected Freshwater Fish

The vote to send to the same public hearing the results of the regulatory review under E.O. 562: 321 CMR 4.0 Fishing, was taken in January. The public hearing to take public comment on the proposals to amend MassWildlife's rules and regulations as listed above was held in conjunction with the June meeting. The matter was expected to be brought to a vote at the July meeting, at the start of the next fiscal year.

Agency Program Reviews

Statewide Piping Plover Habitat Conservation Plan

Chief of Conservation Science Jon Regosin provided a very detailed explanation to the Board at its July meeting on the proposed Piping Plover Statewide Habitat Conservation Plan, which would be submitted and negotiated with the U.S. Fish and Wildlife Service.

Chief Regosin began by providing some background, reporting that the Piping Plover was listed as Threatened by both the federal Endangered Species Act and the Massachusetts Endangered Species Act, that its habitat also has protections under the Wetlands Protection Act, and that its population is managed in accordance with state and federal guidelines. He also reported on the number of breeding pairs in the Atlantic Coast Recovery Units and in the Commonwealth, and stated that, from 125 breeding pairs in 1986, today there are 650 breeding pairs in Massachusetts, which exceeds the recovery goal (625) for the entire Northeast Recovery Unit. Chief Regosin reported that, on the other hand, the average productivity (the number of fledglings per pair) has been decreasing the past several years, due to a combination of predation, storm over-wash of nesting beaches, and human development. He then stated that sound beach management by beach operators is what has led to the larger plover population, and that the current trends are for increased restrictions on beach use, attendant economic impacts and increased conflict with towns and beach-users, a general erosion of community support, the potential for decreased compliance with the guidelines, and more individual Incidental Take Permits and Comprehensive Management Permits.

In the larger context, Chief Regosin reported that a Habitat Conservation Permit (HCP) from the U.S. Fish and Wildlife

Service (USFWS) offers the opportunity to both reframe the plover-recovery story and build relationships to effect positive change in the numbers. He stated that an HCP for Piping Plover would:

Advance plover conservation and recovery by providing a refined strategy for current circumstances;

Incentivize plover conservation by allowing for flexibility as the population increases;

Improve recreational opportunities by making plover management easier;

Increase cooperation and reduce conflict; and

Streamline the process of management and make it more efficient by providing more resources for beach management and conservation.

Chief Regosin then explained that an HCP is required in order to obtain an Incidental Take Permit (ITP) from the USFWS for a federally listed species. The Plan may not jeopardize species recovery (allows an "insignificant impact") and must minimize and mitigate to the maximum extent practicable. He noted that HCPs are much more common in the western United States, and can be a vehicle to advance species conservation by providing a net benefit to the protected species. The proposed permit structure would be an umbrella ITP to MassWildlife, which would then extend its take authorization (sub-permits) to approved landowners and beach managers who 1) meet the eligibility requirements described in the Plan; 2) propose to engage in covered activities that could result in an incidental take, subject to limitations described in the Plan; and 3) apply for and receive coverage from MassWildlife as sub-permittees under the Plan. He discussed the proposed Plan area, stated that the Piping Plover would be the only covered species and that the Plan would be compliant with the MESA and the WPA, reported that the proposed permit term was 25 years, and detailed the proposed covered activities, the impact minimization protocols, and the estimated take exposures in multiple scenarios. Chief Regosin stated that the basic conservation strategy would be mitigation, with selective predator management; education, outreach, and increased law enforcement; and vegetation management and nesting enhancement projects. He reported that predator management alone will more than offset the take under the Plan, and that it would encourage and incentivize continued adherence to the guidelines, with exceptions allowed by the HCP.

In summary, Chief Regosin stated that the HCP would expose a very small number (%) of broods of chicks, nests, and breeding territories to potential take; tie permitted activities to changes in population size; implement minimization measures so that the actual take will be even lower; and implement mitigation that more than offsets any harm from the covered activities.

Director Buckley observed that the agency has good relationships with the towns and the legislators over MESA, and that we need to maintain fairness and community goodwill and good opinion. He also stressed that the USFWS must adhere to its own timelines to protect the ESA, and must administer the Plan according to what they've said they would do. The Director noted that we all risk losing the support of the towns, and that he has been very impressed with Chief Regosin's work with the towns generally.

Chairman Darey offered his congratulations and thanks to Chief Regosin for an excellent job on the HCP and an excellent presentation. The Chairman commented that former Director Rocky Bridges was the first to include habitat in the Wetlands Protection Act; he saw the importance of it, and having it there has made a big difference.

MassWildlife's Fire Management Program

Restoration Ecologist Tim Simmons and Habitat Biologist Caren Caljouw reported to the Board on the agency's prescribed fire program at its December meeting. Mr. Simmons, who is a Certified Burn Boss, began the detailed presentation, stating that they would provide a comprehensive update on the prescribed fire program by reviewing the reasons for burning in Massachusetts and providing information on the program's history, its current status, and its plans for the future.

Mr. Simmons reported that prescribed burning enhances habitat for numerous game species; that Massachusetts supports globally declining fire-dependent resources such as pitch pine-oak barrens, woodlands, and sand-plain grasslands; that 30% of the species protected by the Massachusetts Endangered Species Act (MESA) benefit from the conditions created by wildland and prescribed fire; and that prescribed burning and mechanical treatments allow MassWildlife to responsibly manage the hazardous fuel loads on its Wildlife Management Areas and increase public safety within the wildland-urban interface. He cited and provided detailed discussions of numerous species and natural communities that are fire-dependent, including a total of 136 protected species that benefit from conditions created or maintained by fire. He discussed the fire management program in the context of the recently completed SWAP and some of its target species; its tremendous growth since the late nineties when it began with few burns and few qualified staff; the suite of challenges to the program, some of which

are interrelated in complex ways; recent developments, including equipment upgrades and improved staff training; its many goals, including additional training and equipment; prescribed fire plans for priority sites, and establishing an active fire council with cooperating agencies and organizations; and the many longtime cooperators, who are individuals, sister agencies, and organizations.

The second part of the presentation was narrated by Ms. Caljouw, and Mr. Simmons introduced her as the person who introduced him to prescribed fire many years ago. Ms. Caljouw, herself also a longtime Certified Burn Boss, began with a current map of the priority sites for prescribed burns, saying that there are now 40 priority sites comprising over 16,000 acres. She explained the critical importance of being prepared with a ready, trained crew and completed fire plans, because there are at most about 60 days in most years when all the necessary conditions (e.g., weather) for a burn are met. Starting with the example of the Southwick Wildlife Management Area, Ms. Caljouw went through the exhaustive checklist of documents and procedures developed for each prescribed fire plan; the basic elements of a good burn plan, including the qualifications and levels of training and responsibility of the crew and its hierarchical organization; and the current level of training of MassWildlife staff.

Mr. Simmons then reported that the program had recently been able to secure some needed tools, including its own fire pickup, complete with specialized equipment, and that, in 2015, the program had 18 burning days on over 700 acres of MassWildlife lands, an additional 200 acres in aid to the DCR on properties it burned, plus planning and aid to federal agencies on an additional 500 acres. He noted that it was a busy year but that the program is quickly building its capacity to accomplish even more in the course of coming years.

At the following meeting in January, Restoration Ecologist Tim Simmons and Habitat Biologist Caren Caljouw returned to the Board with a requested list of the species of animals and plants in Massachusetts that benefit from conditions created or maintained by fire:

Birds	14
Mammals	2
Reptiles	6
Invertebrates	36
Plants	85
Total	142

Mr. Simmons and Ms. Caljouw reported that there are also a number of important Natural Communities that benefit from fire, including Heathlands, Pine Barrens, Oak Woodlands and Savannas, Oak Forests, Scrub Oak Plains, Atlantic White Cedar Swamps, Grasslands, and Fens.

Youth Deer Hunt Summary

Wildlife Biologist Trina Moruzzi presented a preliminary report on the Youth Deer Hunt, which was offered for the first time on October 3, 2015, at the October meeting. She reported that youth ages 12-17 were issued an either-sex Youth Deer Permit for Youth Day in 2015. The youth had to have the Youth Permit in order to participate, in addition to any permits or tags they already possessed. Ms. Moruzzi reported that 1,339 Youth Deer Hunt permits were issued; 757 were issued to 12-14-year-olds and 582 were issued to 15-17-year-olds, while there were 1,036 Males, 215 Females, and 88 left the question blank. She reported a preliminary total of 143 deer harvested by the young hunters statewide, with 132 of those deer reported through the MassFishHunt online system, and 83% of the online reports were hunters reporting themselves through MassFishHunt. Of those, 30% used a mobile device. She also pointed out that, if every hunter who applied for a permit participated, that gives an 11% success rate. Ms. Moruzzi also shared some Facebook statistics, including hunter comments, and noted that all the photos of successful hunters in her presentation were taken from the Facebook posts.

Director Buckley noted that the over 1,300 permits applied for and issued for the Youth Deer Hunt means that 1,300 adults were also engaged in the hunt, mentoring and helping these youth prepare and participate.

MassWildlife's 150th Anniversary Planning Review

In January, Communications Specialist Emily Stolarski gave the Board a brief overview, outlining some of the events and resources being developed in the 150th anniversary year of the Division. She reported that a Web link, http://mass.gov/MassWildlife150, was the place to find all things anniversary-related, including the MassWildlife Open House and Birthday Party, already announced for June 4, 2016, which was scheduled to be held at the Field Headquarters with staff and project displays, field demonstrations, and an anniversary ceremony.

Ms. Stolarski also provided some details about the MassWildlife Speaker Series, which is to include lectures and outings at the Cronin Building and statewide. She reported that a full schedule would be released in March and would be made available through MassWildlife's many usual outlets, including in poster form. Ms. Stolarski reported that there would be a commemorative issue of Massachusetts Wildlife magazine, to include contributions from the broad range of the agency's professional staff. Reporting that Field Head-

quarters and District building preparations include banners, photographs, and detailed agency history displays, she also reported that Then-and-Now-themed content would be shared in the agency newsletter, on the Website, and on the Facebook page.

The April monthly meeting saw Communications Specialist Stolarski return to the Board with a brief update on the Division's planning process and preparations for the June 4 anniversary party. Building preparations included banner-stands about the hatcheries and the districts, shelf displays in the atrium, wildlife photographs installed in the atrium and in all first-floor conference rooms, and a new trout pond sign. Using a graphical layout of the first floor and the surrounding grounds, Ms. Stolarski also took the Board through the building and grounds room by room and area by area, explaining the staff demonstrations and activities that will utilize the building and the grounds during the celebration to acquaint visitors with all the Division's diverse programs and projects. In closing, Ms. Stolarski detailed the lists and outlets staff used to publicize the event across the state.

Bringing the Past into the Future: 100 Years of Fisheries Data at Our Fingertips

Fisheries Biologist Jason Stolarski reported in January that the Division has been collecting information about Massachusetts waterbodies – lakes-ponds and rivers-streams – throughout its 150-year history. The vast majority of the information is in paper files, with the potential for damage every time staff accesses the documents and photographs. He also noted that the data in the files is difficult to access or to combine with other, more current data. Mr. Stolarski explained that the project he undertook soon after he was hired was to create a modern digital archive, to bring all this information forward, combine it with modern data, and use it to inform future decisions.

There is descriptive information, from 1910 to the present: site descriptions, correspondence, information about abutters and conservation organizations, and stocking information, all of it stored on paper. And there is also numeric data, from 1950 to the present, including species and abundances at specific locations, with some of it on survey data sheets and the majority stored in a database. Mr. Stolarski explained that the agency started collecting this information to inform stocking decisions, noting that, around the turn of the century, fishing licenses were only required for waterbodies that were stocked by the Division. He then showed pictures of the various types of documents, explained their use and history, and pointing out differences and similarities to today's procedures and methods.

The retrieval system he developed allows every piece of date to be referenced by location (geospatial) using Arc GIS and state maps. Through a series of links to the database, the data can be accessed by a simple point-and-click, and historical and current information are easily combined. Mr. Stolarski closed his presentation by showing the great improvement that he and other fisheries staff have been able to make to some of the more popular pond maps through intensive, digital soundings, and reported that the Pond Maps will be updated over time using this technology and modern fish survey results.

Freshwater Mussels and the Nissitissit River Restoration

Aquatic Ecologist Dr. Peter Hazelton began his presentation at the February meeting by explaining that a freshwater mussel is a bivalve mollusk, like marine clams and mussels; that it is an ecosystem engineer, with numerous important jobs in the aquatic environment; and that it is a parasite, i.e., it uses fish hosts to complete its lifecycle. In Massachusetts, there are 12 species, with six listed under MESA and one federally Endangered, the Dwarf wedgemussel. He also explained that mussels are important as ecosystem engineers that increase water clarity as filter feeders, increase habitat for benthic macro-invertebrates, and increase spawning habitat for fish. Dr. Hazelton also provided additional information about the mussel's life cycle and the many adaptations different species have developed to complete it.
Turning to the Millie Turner Dam Removal project, Dr. Hazelton reported that the dam had been located in Pepperrell, on the Nissitissit River in the Nashua River Watershed, and that it was removed in the fall of 2015. The Nissitissit at that location contained an important mussel community, with two MESA-listed species, two SWAP-listed species, and one common one. Dr. Hazelton further reported that dam removal has both benefits and challenges for mussels. The benefits include increased stream connectivity, the restoration of natural hydrology, and support of native fish communities, while, during and after removal, mussels are susceptible to dewatering, burial by sediments, and changes in available food. He reported that the Brook Floater, a high priority species, is present at the site and that there is a petition for federal listing, with only four populations in Massachusetts. Threats to the species include loss of habitat, habitat fragmentation, and small population sizes.

The Millie Turner dam removal began with habitat surveys in June 2015, both up and downstream of the dam. The mussels that were found were then translocated starting in July 2015, and were moved out of dam-influenced habitat. He reported that the final translocations were done during the dam removal. Long-term monitoring is planned, both of the population's recovery and also of the changes in the habitat. In the course of the project, more than 200 target mussels were translocated, 50% of which were state-listed

species, with the help of more than 25 volunteers and more than 150 volunteer hours.

In the larger picture, Dr. Hazelton stated that a statewide survey and monitoring initiative has been developed for the MassWildlife Districts as follows:

Central District: 2016
Connecticut River Valley District: 2017
Western District: 2018
Southeast District: 2019
Northeast District: 2020

Cooperative research projects are also planned, including collaborations with the Cooperative Research Unit at UMass/Amherst and the USFWS Cronin Aquatic Resources Center (the former Cronin Salmon Station). Restoration and conservation planning is also underway, and Dr. Hazelton is developing techniques, both for species reintroductions and supplementation of small populations. Regarding the Brook Floater, Dr. Hazelton reported that MassWildlife is the lead applicant on a competitive State Wildlife Grant for $500,000 that would be shared across five states, with 75% staying in Massachusetts, funding work by both MassWildlife and UMass. He noted that the decision on the grant will be made in June 2016.

Trout-stocking Web Page

Assistant Director for Fisheries Todd Richards introduced the April meeting to a new page that many staff across MassWildlife and the Department had created, stating that it was a true multi-step, community effort involving MassWildlife Fisheries, Hatchery, District, and Department IT personnel. He announced mass.gov/trout, and took the meeting through the page to illustrate how it works, starting from the Google search page. Users can search by waterbody, by town, or by district, and can get the information, which is updated daily, by lists or by maps.

Citing the benefits of the new page, Assistant Director Richards stressed that not only is the page more helpful to constituents who are looking for up-to-the-day stocking information, but it also provides staff with a central place to perform and monitor many tasks that were formerly tracked on paper or on separate computers and took more time and therefore could create an information lag of days or weeks, including hatchery accounting, stocking-trip planning, and reporting of completed runs, including with species stocked.

Connecticut Valley Wildlife District Report (Ralph Taylor)

In August, the Board met at the Visitor's Center at the Quabbin Reservoir, and Connecticut Valley Wildlife District Manager Ralph Taylor provided the Board with a brief overview of recent District activities, including work being done around the District, some video of recent bear work, and Large Animal Response Team work that the District had been involved in.

Western Wildlife District Report (Andrew Madden)

The board met at the Western Wildlife District office in May, and District Manager Andrew Madden reported that he had been called out of the office earlier that day and had successfully extracted a moose from mud; the animal was being monitored and appeared to be fine. He also reported a successful stocking season and some events, noting that the Division is stocking beautiful fish and kids love them.

Mr. Madden also reported that the District would be taking an intern from the Mass. College of Liberal Arts, noting that he and the District Wildlife Biologist have taught seminars there. Related to requests for wildlife assistance from the public, Mr. Madden reported that bears are the subject of most of the calls and the issues can usually be dealt with over the phone. Mr. Madden also stated that loons have been unsuccessful at nesting lately in the District, so staff has put out floating nests. In stewardship matters, Mr. Madden reported that the focus is working on boundaries. Mr. Madden reported that he has the full complement of staff and together they have ambitious plans to get a lot of work accomplished.

Other Presentations on Topics of Interest to the Board

A History of MassWildlife, 1866-2012

Retired Wildlife Biologist and contractual Archivist James Cardoza was welcomed by the Board members at the July meeting, and he handed out copies of the History for each Board member and the Commissioner and Deputy Commissioner. He then stated that this was never an official project initially, he had just gathered and protected important documents and pictures as they came before him through his years of service to the agency. After Mr. Cardoza's retirement, then-Director MacCallum and then-Deputy Director Buckley had hired him back and urged him to write a history of the agency. Mr. Cardoza stated that the project was more challenging than he had expected, but it had been completed with the publication in paperback about 2 weeks previously. He reported that Chief Marion Larson had helped shepherd the project, Senior Photographer Bill Bryne had provided and/or worked with the photos, and Graphics Specialist David Gabriel created the layout. Noting that CDs are also available, Mr. Cardoza reported that the History focused on the personalities, the internal and external culture, and the systems at the different times, which were

as much influencers of events as what actually happened. Commenting on the cover photo of a salmon, he reminded the Board that this agency had started first as a commission for anadromous fish; he also pointed out that there is a grouse on the agency's seal, so the design team opted for a grouse on the cover.

Western Fire Fighting in Washington State

Habitat Biologist Rebecca DiGirolomo reported to the Board at the September meeting with a PowerPoint presentation on her 3-week tour of duty helping to fight the wildfires that were raging at the time in Oregon. She provided many pictures to accompany her remarks, which chronicled the daily life, working conditions, equipment, assignments, and adventures of the fire crew of which she was a part. Ms. DiGirolomo stated that she would very much like to go again, if needed, and that she felt it was an excellent experience that increased her own confidence and skill level for the controlled burns that the Division carries out on its management areas. Chairman Darey thanked Ms. DiGirolomo for her voluntary service and commended her on behalf of the entire Board, whose members echoed his sentiments.

Canada Goose Banding in Hudson Bay, Quebec

At the October monthly meeting, Wildlife Biologist Susan McCarthy (formerly Ingalls) detailed her work with the Atlantic Population Canada Goose Cooperative Research and Survey Program on the Ungava Peninsula in northern Quebec. The goals of the program are to reliably assess the annual Atlantic Flyway population of the Canada Goose in terms of its current status and rates of productivity, survival, and harvest. She explained that the program does so by attaching metal leg bands to a sample of the population and monitoring the reports over time. It is a cooperative initiative among federal, state, and provincial personnel, and has been operational since 1997, with over 80,000 geese banded.

Ms. McCarthy included many photos in her presentation that chronicled some of the social and geographic aspects of the area she was working in; some of the crew members on her team; the tools and equipment they used; the helicopters and vehicles that transported them; the many species of birds and animals they encountered; and the actual work of identifying, rounding up, and banding the geese. In closing, Ms. McCarthy thanked the Board for supporting such opportunities for staff to contribute to large, cooperative wildlife research projects.

CLfT (Conservation Leaders for Tomorrow) – Bringing Hunting Awareness to a New Conservation Audience

Before this presentation began at the November meeting, Board member Bonnie Booth reported that she was an instructor for the Conservation Leaders for Tomorrow (CLfT) program in 2006, and that Hunter Education Administrator Susan Langlois was a founding instructor. She had thought it a great experience, and was very pleased that Ms. Maier and other staff were taking part in it.

NHESP Database Manager Sarah Maier explained that CLfT is a professional development program designed for student and professional leaders within the natural resource sciences who do not have a personal or family connection to hunting, and said that CLfT focuses on hunting awareness and conservation education among academic programs and government agencies. CLfT consists of 4-day workshops that blend interactive classroom discussion with field experiences to provide insight and a deeper understanding of hunters and hunting culture, given the user-pay-user-benefit funding model of most state fish and wildlife agencies, including Massachusetts'. The professional workshop participants engage with leading natural resource professionals and conservationists in a highly interactive educational setting. Ms. Maier briefed the Board on the MassWildlife staff who have benefited from the program, both as instructors and as participants; the positions and backgrounds of wildlife agency staff who attend; the instructors; the technical demonstrations, field exercises, and roundtable discussions that are part of the curriculum; and what she thought were the highlights of the program: the professional, passionate instructors; the thoughtful and engaging discussions; the exposure she was given to new experiences; the professional and personal connections she made; the actual pheasant hunt she participated in; and the completion of a Hunter Education course and receipt of a Hunter Education Certificate at the end.

Lake Drawdown Review and Study (Allison Roy, UMass)

Assistant Director for Fisheries Todd Richards introduced Coop Unit Leader in Fisheries Allison Roy, who does her research out of and lectures at the University of Massachusetts at Amherst, also during the November meeting. Dr. Roy opened her discussion by noting that she had been hired in part by Director Buckley, who also arranged critical funding to get the Fisheries program in the Coop Unit going. Assistant Director Richards reported that he is currently pursuing his PhD, and that his program advisor is Dr. Roy, who added that she has been on the job almost 4 years, and thinks she literally wouldn't be before this Board or as successful in her research if not for the involvement with Assistant Director Richards and MassWildlife. She reported that Deputy Director Tisa had oriented her when she first began, and asked, after the first priority of getting her lab established, that drawdowns be her Number 2 priority, be-

cause the Fisheries and Wildlife Board is very interested in the effects of the practice.

Dr. Roy reported that her research project so far has completed two of three components. Her team has conducted a thorough literature review of different kinds of drawdowns and their respective effects on lake biota, and has done an assessment of drawdowns in Massachusetts, to find out how common they are and how they compare to drawdowns in other locations.

Dr. Roy reported that her team's is the first literature review on winter drawdowns, and they have produced an executive summary and a synthesis paper of that research. Her research thus far has shown that drawdowns in Massachusetts are unique, and these drawdowns are not well studied. She reported that most research is on a single lake before and after drawdown, while her research is on several lakes, on different drawdown magnitudes, and she has found that there are effects of drawdowns on some biota, but that this is highly variable across lakes.

The third component is the subject of her current work, where her team is conducting six research projects involving 18 lakes. Dr. Roy discussed in detail the questions the team would be studying and the methods it is employing for fish and also for mussels in the subject lakes.

At the close of this presentation, the Board charged Deputy Director Tisa and/or Assistant Director Richards to present to the Board after a reasonable time what Division staff will do to notify conservation commissions and boards of selectmen of Dr. Roy's findings.

Massachusetts Fisheries and Wildlife Board

George L. Darey, Lenox, Chairman
John F. Creedon, Brockton, Vice Chairman
Michael P. Roche, Orange, Secretary
Bonnie Booth, Spencer
Joseph S. Larson, Pelham
Brandi Van Roo, Douglas

Prescribed fire shapes pitch pine-oak communities by favoring fire-tolerant species while temporarily excluding fire-intolerant, generalist species.

Fisheries

Todd A. Richards
Assistant Director, Fisheries

Overview

Fishing in Massachusetts is an important economic and social activity for both residents and non-residents. According to the 2011 National Survey of Fishing Hunting and Wildlife Associated Recreation published by the U.S Fish and Wildlife Service, nearly half a million resident and non-resident anglers fish Massachusetts waters, resulting in more than $100 million in wages, salaries, business earnings and state and federal tax revenues.

The Commonwealth possesses an enormous quantity and variety of freshwater fishing opportunities. Our lakes, ponds, streams, and rivers provide excellent fishing for warm and coldwater species of fish from Cape Cod to the Berkshires. Anglers can find themselves successfully catching bass, trout and panfish in urban settings or remote wildlife management areas.

The Fisheries Section responsibilities include a mix of management and research activities designed to provide excellent recreational opportunities and gain an in depth understanding of the fishery resource, its' status and trends. Fisheries activities require expertise in fisheries management, policy, and aquaculture.

The fisheries section operates an extensive hatchery program that provides an excellent fishery for brook, brown, rainbow and tiger trout. We annually stock more than 400,000 pounds of trout in more than 500 waterbodies across the state, supplementing a wealth of fisheries resources in more than 240 towns. Our hatcheries also produce landlocked salmon for Quabbin and Wachusett Reservoir while providing surplus production that is traded with other state fish and wildlife agencies for northern pike and tiger muskellunge when their surpluses are available.

The fisheries section also carries out research and management on streams, rivers, lakes, and ponds designed to monitor fish communities statewide and provide information to anglers on the more than 20 game fish species that have excellent self-sustaining populations across the Commonwealth.

While several changes occurred within the hatchery system and are fully documented in that portion of the annual report, changes also occurred within the biological staff of the fisheries section. Two new staff members were hired in the Westborough Fisheries section. Adam Kautza was hired in April as the Coldwater Fishery Resource Project Leader and Rebecca Quiñones was hired in May to assume the responsibilities of the Stream and River Project. The section also advertised and interviewed for a Fisheries Operations Biologist position just prior to the end of the fiscal year. Mark Tisa, the Assistant Director of Fisheries for more than 25 years, was promoted to Deputy Director. Todd Richards, a fisheries biologist with MassWildlife since 1992, was promoted to Assistant Director of Fisheries. Fish Kill Investigations, Environmental Review, and Sportfish Awards – Richard Hartley, Project Leader

1. Fish Kill Investigations:

Pursuant to the 1999 Fish Kill Memorandum of Understanding between the Department of Environmental Protection (DEP), the Division of Fisheries and Wildlife (MassWildlife), the Division of Environmental Law Enforcement (DELE) and the Department of Food and Agriculture (DFA), MassWildlife is the lead agency in coordinating fish kill response. The Division received 32 calls relative to incidents which involved dead fish. Of these 32 reports, 13 (41%) were investigated by MassWildlife, DMF, DEP, consultants or local officials to determine the cause of the kills. The final disposition of the 32 reports was 29 natural events including winter/natural kills and species specific kills involving migrating herring and shad, bullhead species, Carp, sunfish species, trout species, Yellow Perch, White Perch and Tilapia. The remainder included 1 kill due to low water and/or low dissolved oxygen, 1 kill due to agricultural practices and 1 kill due to firefighting operations.

2. Environmental Review:

The Fisheries Section of MassWildlife reviewed and provided comments on all major projects affecting fisheries resources published in the Environmental Monitor. The Fisheries Section also provided technical information to a wide variety of consultants, town and state officials on local projects. Projects were reviewed potentially affecting 81 different waters (60 rivers, streams and unnamed tributaries and 21 lakes and ponds) in 60 different cities and towns. Fourteen percent of the requests were received from environmental consulting contractors to fulfill DEP and MEPA filing requirements. The remainders of the requests were from

state agencies such as MassHighway, Mass DEP and Mass DER (78%), federal agencies such as the Army Corp of Engineers (5%) and NGOs and Water Districts (3%). Fisheries resources were partitioned as follows: warm water (37%), coldwater (23%), trout stocked waters (21%), anadromous (2%), brackish (2%) and unknown (15%). The majority of the projects reviewed consisted of bridge replacements/rehabilitations over rivers and streams and road reconstruction including culvert replacements and retaining walls (49%). The remainder of the projects included lake management issues such as and repairs or breaching/removal of dams (18%), herbicide and alum treatments, mechanical harvesting of vegetation, drawdowns, dredging, beach maintenance and stream improvements (18%). Utility work such as pipelines, power lines, new wells, sewer repairs and a desalination plant accounted for 15%.

2015 Catch & Keep

Species	Adult Pins	Youth Pins	Gold Pin Adult	Gold Pin Youth
Bowfin	0	2	na	7 lbs. 4 ozs.
Brook Trout	25	29	4 lbs. 8 ozs.	3 lbs. 13 ozs.
Brown Trout	15	27	8 lbs. 3 ozs.	3 lbs. 10 ozs.
Bullhead	5	15	4 lbs. 0 ozs.	2 lbs. 2 ozs.
Carp	14	7	35 lbs. 11 ozs.	22 lbs. 8 ozs.
Chain Pickerel	18	31	6 lbs. 5 ozs.	6 lbs. 11 ozs.
Channel Catfish	26	3	17 lbs. 8 ozs.	7 lbs. 15 ozs.
Crappie	56	29	3 lbs. 3 ozs.	2 lbs. 5 ozs.
Lake Trout	10	8	19 lbs. 4 ozs.	16 lbs. 1 oz.
Landlocked Salmon	13	7	6 lbs. 7 ozs.	3 lbs. 13 ozs.
Largemouth Bass	13	42	9 lbs. 2 ozs.	8 lbs. 9 ozs.
Northern Pike	18	4	24 lbs. 2 ozs.	22 lbs. 15 ozs.
Rainbow Trout	17	23	6 lbs. 9 ozs.	4 lbs. 1 oz.
Shad	3	2	6 lbs. 8 ozs.	4 lbs. 2 ozs.
Smallmouth Bass	12	22	6 lbs. 6 ozs.	5 lbs. 3 ozs.
Sunfish	26	14	1 lb. 6 ozs.	1 lb. 0 ozs.
Tiger Muskellunge	1	1	13 lbs. 10 ozs.	17 lbs. 3 ozs.
Tiger Trout	9	22	3 lbs. 13 ozs.	3 lbs. 4 ozs.
Walleye	4	2	7 lbs. 14 ozs.	3 lbs. 6 ozs.
White Catfish	5	3	6 lbs. 7 ozs.	5 lbs. 0 ozs.
White Perch	24	15	2 lbs. 3 ozs.	1 lb. 8 ozs.
Yellow Perch	29	21	2 lbs. 5 ozs.	1 lb. 15 ozs.

3. Freshwater Sportfishing Awards Program

Spring of 2016 marked 53 years of the Freshwater Sportfishing Awards Program. Minimum qualifying weights are currently in place for 22 different species of fish. Beginning in 2005, lower minimum weights for Youth Anglers (age 17 and under) were established. This addition has resulted in a near doubling of the number of pins awarded annually. Upon weighing a fish on a state certified scale, the angler receives a bronze pin depicting the species of fish with the weight and year of catch stamped on the back. In addition to the bronze pin, the lucky adult and youth anglers who weigh in the largest fish of the year for each of the categories is awarded a plaque and gold pin at an annual awards ceremony. New for 2015 was the addition of a long-awaited Catch and Release component that allows anglers to photograph their catch at the site of capture against a ruler and immediately release the fish. Also new for 2015 was the addition of the first new species to the program since 1979, Bowfin. Affidavits are still being received for 2016, so results from 2015 are presented here. After a record setting year in 2010 (1,131), the number of pins awarded annually have dropped slightly with 927 awarded in 2015 (up 45 from 2015). Pins were awarded in all 22 categories for both Adult and Youth anglers for calendar year 2015 (343 for Adult and 329 for Youth Catch & Keep pins, there is no age distinction for Catch & Release).

2015 Catch & Release

Species	# of Pins	Gold Pin (inches)
Bowfin	1	28
Brook Trout	8	18
Brown Trout	2	24
Bullhead	20	20
Carp	33	41
Chain Pickerel	17	27
Channel Catfish	7	28.5
Crappie	25	15.75
Lake Trout	0	na
Landlocked Salmon	8	24.5
Largemouth Bass	53	23.75
Northern Pike	6	43
Rainbow Trout	4	23
Shad	6	25
Smallmouth Bass	9	22.5
Sunfish	19	11.25
Tiger Muskellunge	0	na
Tiger Trout	10	22
Walleye	3	27
White Catfish	5	26.5
White Perch	8	15.25
Yellow Perch	11	16.5

The first year of Catch & Release was well received with the pins spilt 72% weighed fish versus 28% measured and released. For the third year in a row, Crappie was ranked number one overall (with Largemouth Bass a close second by a mere two pins) as well as for all Catch & Keep pins. Crappie was also number one for Adult Catch & Release anglers while Largemouth Bass was ranked number one among Youth Catch & Release anglers. Beginning in 2013 both an Adult and Youth Angler of the Year has been awarded for the Catch & Keep category while this was the first year for the Catch & Release Angler of the Year (no age distinction). The Angler of the Year Awards are presented to the anglers who submit the highest number of the 22 eligible species. For 2015, the Adult Catch & Keep Angler of the Year was three time winner Mark Mohan, Jr., of Pembroke who submitted 16 species. The Youth Angler of the Year winner (and first ever female winner) was Tauri Adamczyk of Taunton who weighed in 15 species. The first ever Catch & Release Angle of the Year winner was Michael Nee of Northborough who measured and released 15 eligible species.

4. Bass Tournament Creel Analysis

For the past 20 years, the Fisheries Section has been monitoring the results of black bass (Largemouth and Smallmouth Bass) tournaments to help establish a long term database of variables such as catch rates and average fish size for specific waters. Any organization which requests the use of a facility governed by the Office of Fishing and Boating Access (OFBA) to hold a fishing event must receive a Special Use Permit. As part of the permit, the OFBA includes a creel sheet to be completed by the fishing club at the close of the event. Additionally, individual bass clubs as well as the Massachusetts Chapter of B.A.S.S. (Bass Anglers Sportsman Society) have been given creel sheets in an attempt to generate information on tournaments held at non OFBA facilities. The creel sheets are also available to download on the Division's website and as of 2013, can be filled out and submitted electronically. The completed creel sheets are mailed to the Warm/Coolwater Project Leader at the Field Headquarters. The creel seeks the following information: club name, date of event, location of event, start and end time, number of anglers, number of anglers weighing bass, number of anglers with limits of bass, total number of bass weighed in by species, total Largemouth Bass over 5 pounds, total Smallmouth Bass over 3 pounds, number of bass returned alive by species, total weight, winning weight and the weight of the biggest bass of the event. There is also a space for the club to include comments. This information is entered into a database to allow the Division to detect long term trends in the bass populations in some of the Commonwealths most heavily fished waters. Creel sheets are still being received for the 2016 tournament season, so results from the 2015 season are presented here.

In 2015, a total of 255 usable creel sheets were sent in to the Field Headquarters. This represents a voluntary reporting rate of 35% based on the number of Special Use Permits issued by the OFBA. These 255 tournament creel sheets represented 54 different bass fishing organizations fishing on 55 different waters. A total of 7,932 Largemouth Bass and 1,357 Smallmouth Bass were weighed in for a catch rate of 0.32 bass per angler hour. The average weight of a bass weighed in was 1 lb 15 oz. 85% of all anglers weighed at least one bass while 39% caught a limit (5 bass total of either species). 99% of all bass were returned to the waterbody where they were caught alive at the close of the tournaments. Despite increasing tournament pressure, these indices have not changed significantly since tracking began in 1996.

For waters that hosted four tournaments or more, Wequaquet Lake, Barnstable had the highest catch rate overall at 1 bass per 2 hours of fishing. Manchaug Pond, Sutton yielded the highest percent of anglers weighing bass (95%) while Otis Reservoir, Otis had the highest percent of anglers with limits (73%). A breakdown of the number of tournaments by waterbody revealed that most hosts only a few a year while the two highest occurrences continue to take place on the Connecticut River and Congamond Lake, Southwick which generated creel sheets for 14 and 18 tournaments respectfully (13% of all tournaments). Long Pond, Lakeville/Freetown, Nippenicket Lake, Bridgewater, South Watuppa Pond, Fall River, Webster Lake, Webster, Monponsett Pond, Halifax and Whitehall Reservoir all hosted 10+ events in 2015. Over time, this data will aid in detecting possible changes to these important Largemouth and Smallmouth Bass fisheries.

Beginning in 2006, due to its status of consistently hosting high numbers of tournaments, the bass fishery of Congamond Lake, Southwick has been annually monitored for many of the same parameters provided by the statewide bass creel survey. This monitoring will aid in determining if the large number of bass tournaments is having a measurable impact on the bass population.

Fisheries Watershed Project – Jason Stolarski, Ph.D., Project Leader

Activities included in this project in FY 16 concentrated primarily on improving lake and pond maps, conducting lake and pond fish community surveys, database and GIS activities and assessing lake trout populations on Quabbin and Wachusett Reservoirs. Brian Eaton and Caley Earls were hired as seasonal fisheries technicians within the fisheries section in late May 2016. Brian and Caley assisted with the lake and pond sampling efforts from May through the end

of June. They were responsible for the preparation, staging, and cleaning of sampling gear and assisted while deploying sampling gear, boat electrofishing, weighing and measuring fish, and recording data. When not in the field Brain and Caley entered historic lake and pond sampling data into an electronic database, filed raw datasheets, entered current years data into electronic form, performed maintenance of sampling gear, assisted in making bathymetric maps using Arc GIS, and scanned raw datasheets for inclusion into our electronic filing systems. At the end of the fiscal year Brian and Caley had entered roughly three quarters, or over 2,200 samples collected between 1950 and 1995 into electronic form. They were essential members of the fisheries section while they were here and allowed the section to complete almost double the number of lake and pond surveys it typically conducts during a summer.

1. Lake and Pond maps

Massachusetts division of fisheries and wildlife pond maps are an essential tool for anglers. These maps provide information on species composition, catch trends, access, and bathymetry but have not been updated for 20 years or in some cases even longer. As a result, critical pieces of information such as species stocked, points of access, and catch trends are out of date or inaccurate. Over the past 3 years the fisheries section has been working to update these maps.

Advances in GPS and sonar allow the rapid collection of bathymetric data that, combined with modern statistical techniques, are used to create high resolution bathymetric maps. Data are obtained using a paired global positioning system (GPS) and depth sounder. This device collects GPS coordinates and a depth sounding simultaneously and stores them within its onboard memory. Data are typically collected at two second intervals as a biologist navigates a grid pattern across a waterbody by boat (Figure 1). Back in the office, the data are exported to a spreadsheet then using R scripts, NA values and redundant points are automatically removed. The points are then imported into ArcGIS, projected, and extreme depths (outliers) are visually identified and removed. False, or otherwise inaccurate depths can be recorded when the sounder has difficulty receiving or holding the signal from the sonar beam as it reflects off the lake bottom. Inaccurate depths are most frequently recorded over dense aquatic vegetation, or when bathymetry changes rapidly. Inverse distance weighted interpolation is then used to create a 1m gridded bathymetry dataset which is then smoothed using focal statistics. The size of the focal cell used to smooth the original bathymetry data varies according to the size of the waterbody and complexity of its submerged features. Finally, contours are extracted using the contour tool (Figure 1).

New pond maps are made by placing these gridded data and contour polygons on top of topographic maps within ArcGIS and then adding additional features of interest such as dam location, major roads, access points, significant underwater hazards, and hydrography (Figure 2). Similarly, pond summaries are updated with current information concerning points of access, species composition, catch statistics, and stocking information. In addition, new information including the presence of conserved lands, drawdown information, and ramp coordinates are also added.

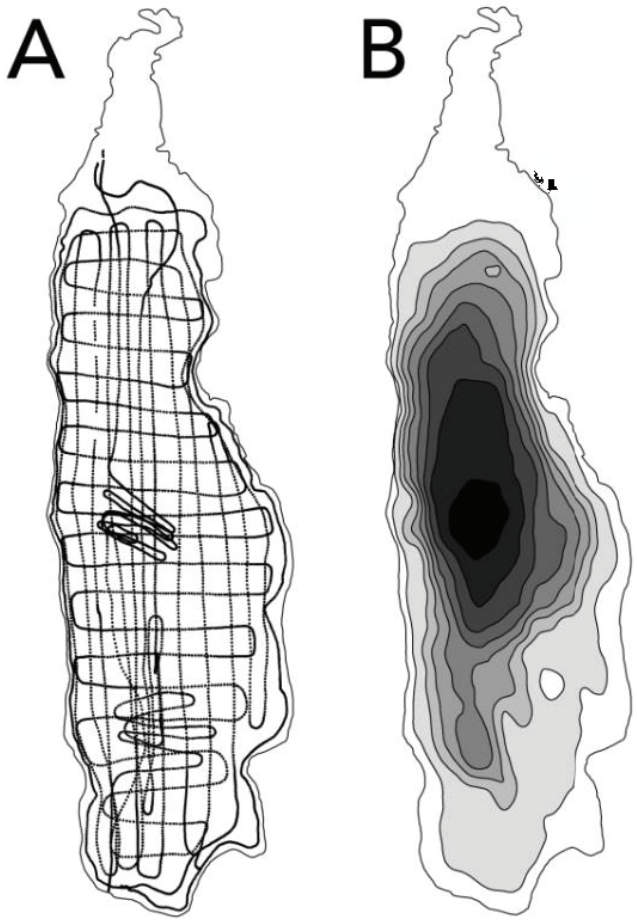
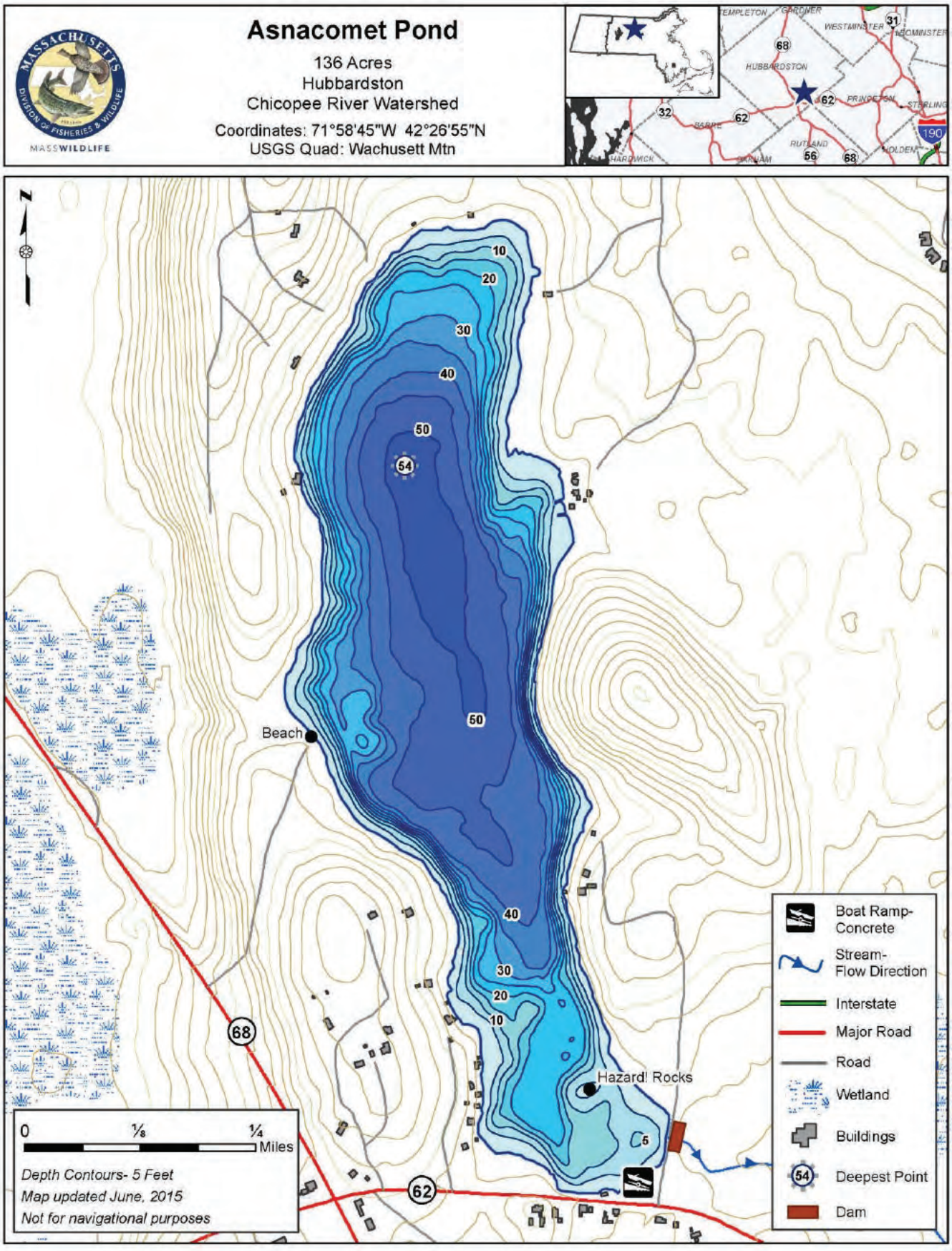


Figure 1: Outline of Browning Pond in Spencer showing bathymetry points (A) and interpolated bathymetry data (B).

Figure 2: Completed pond map.
For information on the number of ponds for which bathymetry and revised narratives have been developed, see the GIS Project annual report below.



2. Lake and Pond sampling

Examination of the Masswildlife fisheries database showed that, over the past 20 years, lake and pond habitats have been sampled at a much lower frequency relative to stream habitats. To fill data gaps, but also to update pond summaries with current fisheries data the fisheries section has begun to focus on conducting lake and pond samples in greater frequency. Waterbodies are selected based upon access, stocking, and use and are then sampled over a two day period using fyke nets, minnow traps, and boat electrofishing.

Typically, minnow traps (N=10) and a fyke net are deployed on the first day within littoral habitats of the waterbody. All gear is marked with reflective buoys and left to fish overnight. Dissolved oxygen, temperature, conductivity, and pH are then measured at 1m intervals at the deepest point in the waterbody. The following day, sampling gear is pulled and all fish captured are identified to species, weighted to the nearest gram and measured to the nearest mm. Boat electrofishing is then used to sample littoral habitats of the pond and fish are processed as before. In general, the entire shoreline is sampled or as much of the shore as time permits.

Back in the office, data are entered into a database, and checked for errors. Linear modeling is used to determine 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. The slope coefficient of the species and waterbody specific regressions and the mean studentized residuals from the statewide regression by site and species are used to characterize the relative condition of the fish contained within each waterbody. As data are collected on additional waterbodies, these analyses will become more precise and permit more complex modeling. During the 2015 fiscal year, the fisheries section has conducted fisheries surveys on 18 waterbodies throughout the commonwealth (Table 2).

3. Lake trout sampling

Lake Trout are known to inhabit only two waterbodies in Massachusetts: Quabbin Reservoir and Wachusett Reservoir. In response to concerns regarding the growth of the population in Quabbin Reservoir, a mark-recapture project was initiated in 2006. In 2014, a similar effort was initiated in Wachusett Reservoir. 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 passive integrated transponder (PIT) tag using a PIT tag reader. If no tag is present, a 10mm passive integrated transponder tag (PIT) 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.

Back in the office, data are entered into a database and growth rates are calculated from recaptured fish. Linear modeling is used to determine the relationship between log transformed weight and length within and among years. Means of studentized residuals among years and sexes are used to evaluate changes in relative condition among these demographics.

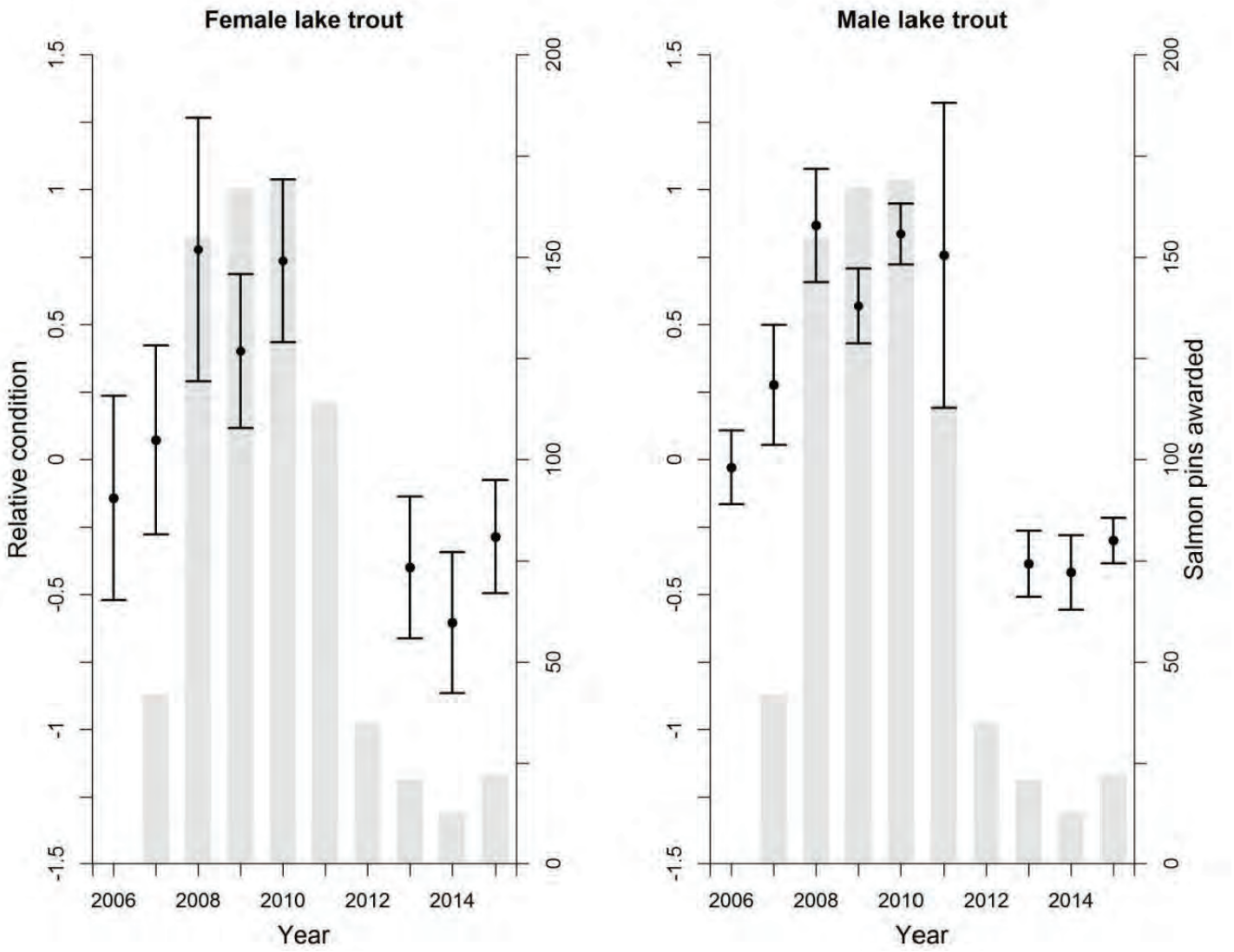
This year a total of 559 Lake trout were tagged; 398 within Quabbin Reservoir and 161 within Wachusett Reservoir (Table 1). Within Quabbin Reservoir, 31 of the 398 fish captured were recaptures which displayed a mean recapture interval of 3 years with a maximum of 9 years. Among the 106 fish recaptured in Quabbin since 2006, the annual growth rate expressed as a percentage of body length is 2.6% which equates to approximately 9mm per year. Within Wachusett Reservoir, 6 of the 161 Lake trout were recaptures; each tagged in the previous year. From this limited number of recaptures, the annual growth rate expressed as a percentage of body length is 2.7% which equates to approximately 15mm per year. As more recaptures are encountered in successive years this estimate is likely to change.

Analysis of relative condition among sexes indicates a decline in condition factor between 2011 and 2013 for both sexes within Quabbin Reservoir (Figure 3). It is difficult to access any trends in condition among male and female Lake Trout in Wachusett Reservoir due to the limited number of years of data (Figure 4).

4. Fisheries Database

This year, close to 500 historic stream surveys from the 1940's and 1950's were added to the fisheries database. These samples were contained in old basin reports and prior to their inclusion in the database, existed only on paper. As such, this information was not searchable or considered when assessing the fisheries resources of a particular stream. These efforts now permit biologists to review data collected over a roughly 80 year time span when assessing the ecological character of a stream. Furthermore, biologists are able to compare the fish community of a particular stream over long time periods. Presently, efforts are underway to add historic lake and pond samples in a similar fashion. To date, 1800 additional lake and pond samples have been entered into electronic form and await review

Figure 3: Male and female Lake Trout relative condition factor with 95% confidence intervals among years for Quabbin Reservoir. Shaded bars plotted on the secondary y axis depict the number of landlocked salmon submitted to the Freshwater Sportfishing Awards Program that were caught from Quabbin Reservoir over the same time period.

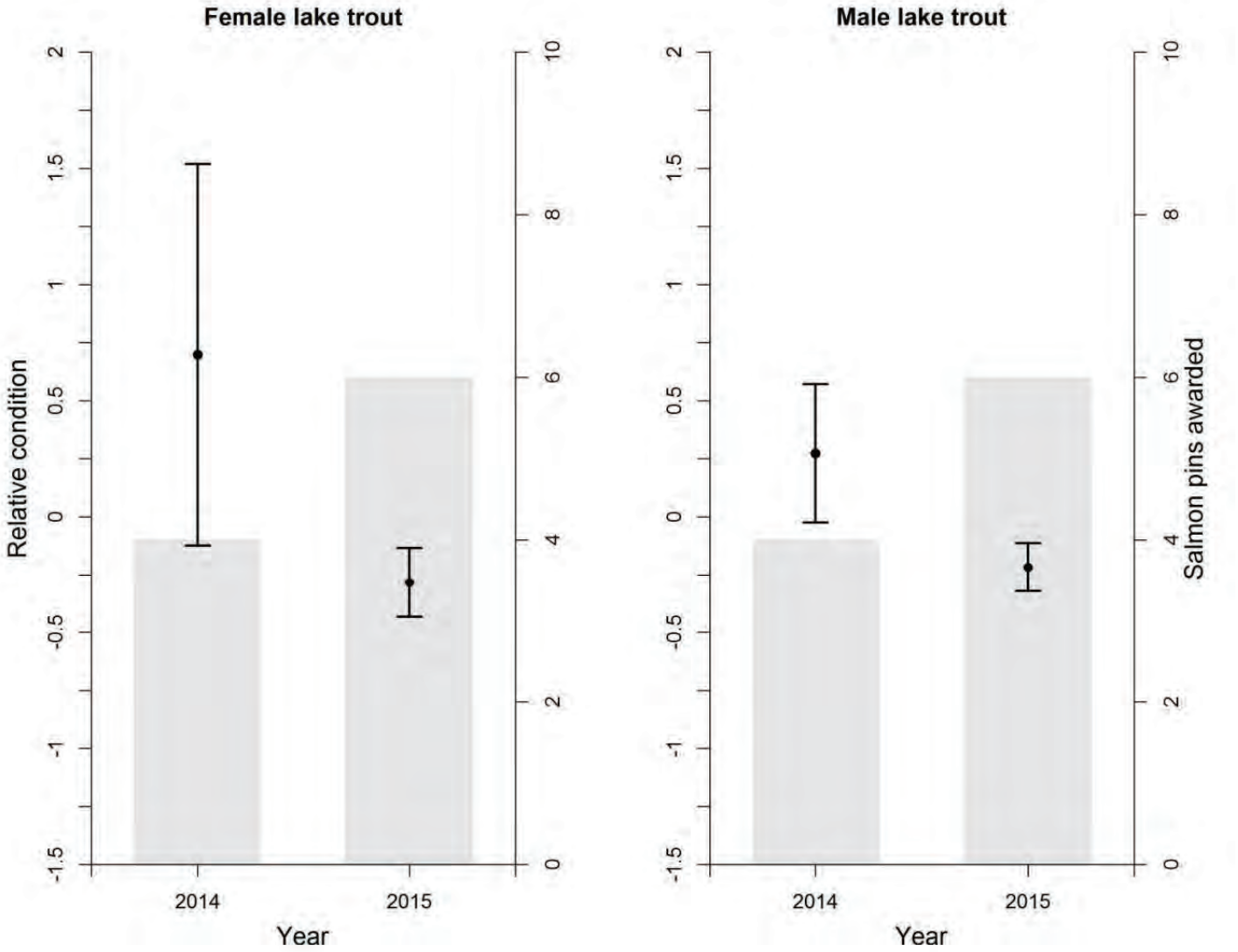


for addition to the database. By the time these efforts are completed, we will have effectively doubled the number of samples contained within the fisheries database from approximately 5000 to roughly 10000.

5. Fisheries GIS layers

As modern fisheries surveys are conducted and historic surveys are converted to electronic form these data are entered into the fisheries database. Several GIS products are created from these data and each time new information is added to the fisheries database these GIS layers must be updated. Following the addition of samples into the fisheries database, R scripts are used to create a table of summary data for each sampling point. Such information includes, species, abundances, sample type, date, presence of coldwater fish, hyperlinks to 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 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. Finally, sampling points are snapped to stream lines and polygons,

Figure 4: Male and female Lake Trout relative condition factor with 95% confidence intervals among years for Wachusett Reservoir. Shaded bars plotted on the secondary y axis depict the number of landlocked salmon submitted to the Freshwater Sportfishing Awards Program that were caught from Wachusett Reservoir over the same time period.



Spring trout stocking at Jamaica Pond, Jamaica Plain in Boston.

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 subsetting these master layers using simple queries in ArcGIS.

Table 1: Number of Lake Trout tagged and recaptured Lake Trout from Quabbin and Wachusett Reservoirs since the inception of the two tagging projects.

Year	Quabbin Reservoir		Wachusett Reservoir	
	Tagged	Recaptured	Tagged	Recaptured
2006	279	NA		
2007	57	2		
2008	109	6		
2009	191	13		
2010	177	30		
2011	6	0		
2012	0	0		
2013	254	16		
2014	290	14	110	NA
2015	398	31	161	6
Total	1761	112	271	6

Table 2: Waterbodies where fisheries survey have been conducted including date the survey was performed and location of the waterbody.

Date	Palis Number	Waterbody	Town	District
8/14/2015	21005	Ashmere Lake	Hinsdale/Peru	Western
8/18/2015	21078	Onota Lake	Pittsfield	Western
8/19/2015	21088	Richmond Pond	Richmond/Pittsfield	Western
8/26/2015	21014	Lake Buel	Monterey	Western
8/27/2015	21040	Lake Garfield	Monterey	Western
9/2/2015	21043	Goose Pond	Lee/Tyringham	Western
9/4/2015	21105	Stockbridge Bowl	Stockbridge	Western
9/9/2015	31027	Otis Reservoir	Otis/Tolland	Western
9/14/2015	36131	Quacumquasit (South) Pond	Brookfield	Central
9/21/2015	32021	Lake Congamond	Southwick	CT Valley
5/16/2016	51135	Lake Ripple	Grafton	Central
5/23/2016	36056	Eames Pond	Paxton	Central
5/26/2016	35083	Stoddard Pond	Winchendon	Central
6/1/2016	36206	Dearth Hill Pond	Brimfield	CT Valley
6/2/2016	36169	Woodman Pond	Brimfield	CT Valley
6/7/2016	35017	Lake Dennison	Winchendon	Central
6/16/2016	51172	Wallum Lake	Douglas	Central
6/21/2016	36082	Long Pond	Rutland	Central

Fisheries GIS Project - David Szczebak, Project Leader

Activities included in this project in FY 16 concentrated primarily on the development of a new stocked waters application, revision of pond maps and narratives, and Coldwater Fishery Resource datalayer revision.

1. Stocked Waters Application

In FY2016 GIS staff devoted a good deal of time to developing and testing a new 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. Information from the database automatically populates the public stocking list accessible on the Division's website. The resulting system has eliminated much of the manually-generated orders, lists, and emails that were previously used to generate the same stocking orders and schedules.

The online, interactive list and map were rolled out in time for our spring, 2016 stocking. The new web application met with very positive reaction from the public. For the first time, our constituency was able to view trout stocking locations on a map. Both the list and map were updated on a real-time basis to give the public updated stocking information.

For the period of spring trout stocking, from April 4, 2016 - June 30, 2016, the stocking application web pages received a total of 248,904 hits. The monthly breakdown was as follows: April- 150,423, May- 77,532, and June- 20,949.

During the testing phase, we tried to optimize the application usage from mobile devices. Examining public usage statistics, the stocking application was accessed almost exactly half of the time from personal computers, and half from mobile devices.

Friday saw the most traffic to the stocking application. A daily breakdown is as follows:

Daily Average Visits	2,829
Monday	2,313
Tuesday	2,874
Wednesday	2,743
Thursday	3,354
Friday	3,921
Saturday	2,624
Sunday	1,974

2. Pond Map and Narrative Revision

In FY2016, the Fisheries section conducted more bathymetric surveys of lakes and ponds, and updated the pond maps available to the public. Pond map write-ups were updated based on recent sampling as well as information provided by the MassWildlife District Offices. New pond maps begun in FY2015 and accompanying write-ups were posted to the MassWildlife web site. Bathymetric surveys were conducted on an additional 25 ponds and draft narratives completed for those ponds. These new maps and information will also be made available on the Division's website. A breakdown of ponds for which bathymetric surveys have been conducted, new narratives completed, and those maps available to the public, is as follows:

Pond name	Town	Bathymetry	Narrative	Map/Information Posted
Asconomet	Hubbardston	Yes	Yes	Yes
Buel	Monterrey	Yes	Yes	Yes
Chauncy	Northborough	Yes	Yes	Yes
Demond	Rutland	Yes	Yes	Yes
Garfield	Monterrey	Yes	Yes	Yes
Goose	Lee	Yes	Yes	Yes
Greenwater	Becket	Yes	Yes	Yes
Indian	Worcester	Yes	Yes	Yes
Leverett Pond	Leverett	Yes	Yes	Yes
Little Chauncy	Northboro	Yes	Yes	Yes
Long Pond (Rutland)	Rutland	Yes	Yes	Yes
Manchaug	Sutton	Yes	Yes	Yes
Onota	Pittsfield	Yes	Yes	Yes
Pratt Pond	Upton	Yes	Yes	Yes
Richmond Pond	richmond	Yes	Yes	Yes
Singletary	sutton	Yes	Yes	Yes
Stockbridge Bowl	stockbridge	Yes	Yes	Yes
Whalom	Lunenburg	Yes	Yes	Yes
A1_site	Westborough	Yes		
Ashland Reservoir	Hopkinton	Yes		
Ashmere	Hinsdale	Yes		
Big Alum	Sturbridge	Yes		
Boon lake	Hudson	Yes		
Browning Pond	Oakham	Yes		
Congamond	Southwick	Yes		
Cotituit	Framingham	Yes		
Dearth_hill	Brimfield	Yes		
Dennison	Winchendon	Yes		
Eames Pond	Taunton	Yes		
Fort pond	Oakham	Yes		
Fresh Pond	Cambridge	Yes		
Hamilton Reservoir	Holland	Yes		
Hopkinton Reservoir	Hopkinton	Yes		
Littleville Reservoir	Huntington	Yes		
Otis Reservoir	Otis	Yes		
Quabog Pond	Brookfield	Yes		
Quinsigamond Lake	Worcester	Yes		
Ripple	Grafton	Yes		
Rocky Pond	Northborough	Yes		
Sabbatia Lake	Qunicy	Yes		
South (Quacimquaset) Pond	Brookfield	Yes		
Spot Pond	Cambridge	Yes		
Sugden reservoir	Spencer	Yes		
Wallum Lake	Douglas	Yes		
Webster Lake	Webster	Yes		
Wicabog	West Brookfield	Yes		
Woodman	Brimfield	Yes		
Wyola	Leverett	Yes		

3. Coldwater Fisheries Resources Datalayer Revision

Using sampling data from the past year we updated the Coldwater Fisheries Resource (CFR) data layer to be current as of January, 2016. Based on the sampling data, 23 new streams were designated as Coldwater. The updated CFR information was uploaded to the MassWildlife website as both a searchable list, and as an interactive web map. The updated data was also made publicly available through the state MassGIS website.
When updating our new stream sampling information, we have occasionally found sampling done on streams not mapped in the base map hydrographic layer, NHD (National Hydrographic Dataset). These locations were mapped in GIS, then passed back to the USGS for inclusion in the national data. The MassWildlife copy of the data was then synched to the national model.

Hatchery/Trout Program Annual Report – Kenneth Simmons, Ph.D., Project Leader

The Division's five hatcheries produced a total of 478,235 pounds of trout in FY2016. The annual production goal is 400,000 to 450,000 pounds. This 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 permit that each hatchery is issued by the Massachusetts Department of Environmental Protection and the Federal Environmental Protection Agency. Overall, a total of 549,037 brook, brown, rainbow and tiger trout were stocked during FY2016 (fall 2015 and spring 2016) (Tables 1 and 2).

The overall quality and size of the trout produced in FY2016 was outstanding. Seventy six percent of the trout produced were at least 12+, which exceeded the program goal by 50%. Spring and fall stocking consisted of more than 261,000 rainbow trout in the 14+ size category that averaged 1.2 pounds apiece. The 178,899 yearling rainbow trout produced at McLaughlin Hatchery in the spring were truly outstanding. Twenty eight percent of these fish were longer than 15 inches and weighed more than 1.25 pounds each. More than 1,900 broodstock-size brook trout and brown trout from Palmer and Sandwich Hatcheries that averaged nearly 3 pounds each were also stocked across the state.

A total of 74,428 trout consisting of 52,675 rainbow trout that averaged more than 14 inches long, and 13,753 rainbows and 8,000 brown trout that averaged 12 inches long were stocked in fall 2015. Overall, a total of 61,627 pounds of rainbow trout and 4,316 pounds of brown trout were stocked in the fall.

In spring 2016, a total of 474,609 trout were stocked comprising 421,292 pounds (Tables 1 and 2). The most abundant species stocked was rainbow trout with a total of 261,530 fish and 291,019 pounds. 80% of the rainbow trout stocked were in the 14+ size category and averaged 1.21 pounds each. Spring stocking also included a total of 45,586 pounds of brook trout comprising 86,846 fish that ranged between 6 and 18+ inches long. Fifty percent of the brook trout were in the 12+ size category that averaged 0.74 pounds apiece. 123,549 brown trout that ranged between 6 and 18+ inches long and totaling 81,713 pounds were also stocked. Forty percent of the brown trout were in the 14+ size category and averaged 1.2 pounds apiece. Spring stocking also included 2,684 tiger trout in the 14+ size category with a total weight of 2,974 pounds (Tables 1 and 2). The average weight of the tiger trout was 1.1 pounds per fish. Tiger trout are a cross between a brown trout female and brook trout male. They are called tiger trout because of their striking tiger-like stripes.

Production of brook trout and brown trout eggs from broodstock continued at Roger Reed and Sandwich Hatcheries in FY2016 (Table 3). Roger Reed Hatchery produced a total of 403,000 fertilized brown trout eggs and 603,000 fertilized brook trout eggs. Sandwich Hatchery produced a total of 178,210 fertilized brown trout eggs and 73,620 fertilized brook trout eggs. Sandwich Hatchery also produced approximately 104,284 fertile tiger trout eggs. Approximately 100,000 of the eyed brown trout eggs produced at Palmer Hatchery were exchanged for landlocked Atlantic salmon eggs with the Maine Department of Inland Fisheries and Wildlife Grand Lake Stream hatchery.

Roger Reed Hatchery continued production of landlocked Atlantic salmon in FY2016 (Table 3). A total of 10,030 landlocked salmon smolts that averaged 8.8 inches were stocked in Quabbin Reservoir in May. In May a total of 2,000 landlocked salmon smolts were transferred to the New Jersey Division of Fisheries and Wildlife's Hackettstown Hatchery in exchange for northern pike fry. A total of 3,108 surplus landlocked salmon weighing 2,390 pounds were stocked in Wachusett Reservoir in October. The remaining 2,400 (1,856 pounds) salmon from this surplus lot were transferred to Hackettstown Hatchery in exchange for tiger muskellunge.

Several hatchery infrastructure improvement projects were initiated or completed in FY2016. Vinyl siding was installed on the office, lower garage and workshop buildings at Sunderland Hatchery. The Sunderland Hatchery office building also was insulated and all non-insulated windows and doors replaced with insulated units. Staff at Sunderland and Montague Hatcheries continued their long-term effort to rebuild raceways with interlocking cement blocks, a meth-

od that staff has found to be the most cost effective way to rebuild old wooden and dirt-walled raceways at these facilities. At Sandwich Hatchery, well number 1 was cleaned and redeveloped by the liquid CO2 injection process, which increased well production about 15%. New pumps and motors were also installed on wells 1 and 3 and the concrete walls in raceways I and J were also repaired.

Construction began in June on a mile-long pipeline that will deliver 6 million gallons of water per day from Quabbin Reservoir to McLaughlin Hatchery by gravity. This is a joint project between the Division and the Massachusetts Water Resources Authority (MWRA). The pipeline will be tapped into the Chicopee Valley Aqueduct upstream of the MWRA water treatment facility in Ware. The hatchery will yield energy savings of $60,000 from the pipeline due to reduced use of the Swift River pumping station. The MWRA will also generate electricity from a hydropower turbine located in the pipeline just downstream from the connection with the aqueduct.

The pipeline will replace the Swift River as the primary water supply for the hatchery, although the river pump station will be maintained as a backup. Since the pipeline water will come directly from an intake located in the cold water layer in Quabbin Reservoir, the pipeline water will have a more optimal year-round temperature profile for McLaughlin Hatchery trout compared to water that is pumped directly from the Swift River. The pipeline will also mitigate many of the disease, parasite and other stresses trout undergo in the hatchery when warmer than normal water is pumped from the Swift River that occurs when Quabbin Reservoir is full and spills surface water directly into the Swift River, especially during summer. The pipeline will also eliminate many other problems associated with the Swift River pumping station, such as mechanical pump failure, power failure, and pump shutdown caused by blockage of the water intake screens by snow, ice, leaves or other debris. The hatchery pipeline portion of the project is scheduled to be completed in December 2016.

There were a number of personnel changes in the hatcheries in FY2016. At Sandwich Hatchery, Adam Davies was promoted from Assistant Hatchery Manager to Hatchery Manager and Greg McSharry was promoted from Wildlife Technician II to Assistant Hatchery Manager. Conor McMorrow was hired to fill the Wildlife Technician II vacancy created by McSharry's promotion. Shasta Slade, Wildlife Technician II at Sunderland Hatchery, transferred to the Connecticut Valley Wildlife District and was replaced by Richard Pecorelli, who transferred from the Northeast Wildlife District. At Montague Hatchery, Alan Jackson, Wildlife Technician III, retired after more than 26 years of service to the Division. Chester Hall IV was promoted from seasonal Hatchery Technician I to a vacant Wildlife Technician II position at Montague Hatchery. Ryan Cleveland was hired to fill the vacant seasonal Hatchery Technician I position.

Table 1. Summary of the number of trout produced at each of the Division's five fish hatcheries in FY2016 (fall 2015 and spring 2016).

		Number of Fish					
Species	Size Category (inches)	Bitzer	McLaughlin	Palmer	Sandwich	Sunderland	Total Number of Fish
Rainbow Trout	9+	11650	0	0	0	0	11650
	12+	0	0	0	0	54619	54619
	14+	24300	196071	0	41318	0	261689
	Sub-total	**35950**	**196071**	**0**	**41318**	**54619**	**327958**
Brook Trout	6 - 9	4000	0	0	0	0	4000
	9+	0	0	0	0	39860	39860
	12+	26894	0	0	9418	5651	41963
	18+	0	0	335	688	0	1023
	Sub-total	**30894**	**0**	**335**	**10106**	**45511**	**86846**
Brown Trout	6 - 9	0	0	0	0	0	0
	9+	20900	20100	0	0	32600	73600
	12+	8000	0	0	0	0	0
	14+	19700	0	0	11908	17427	49035
	18+	0	0	478	436	0	914
	Sub-total	**48600**	**20100**	**478**	**12344**	**50027**	**131549**
Tiger Trout	14+	0	0	0	2684	0	2684
	Sub-total	**0**	**0**	**0**	**2684**	**0**	**2684**
Total		115444	216171	813	66452	150157	549037

Table 2. Summary of the pounds of trout produced at the Divisions five fish hatcheries in FY2016 (fall 2015 and spring 2016).

Species	Size Category (inches)	Bitzer	McLaughlin	Palmer	Sandwich	Sunderland	Total Pounds of Fish
Rainbow	9+	6709	0	0	0	0	6709
Trout	12+	0	0	0	0	40305	40305
	14+	20706	243370	0	41556	0	305632
	Sub-total	**27415**	**243370**	**0**	**41556**	**40305**	**352646**
Brook	6 - 9	1000	0	0	0	0	1000
Trout	9+	0	0	0	0	11122	11122
	12+	19594	0	0	7613	4105	31312
	18+	0	0	738	1414	0	2152
	Sub-total	**20594**	**0**	**738**	**9027**	**15227**	**45586**
Brown	6 - 9	0	0	0	0	0	0
Trout	9+	4927	7238	0	0	9556	21721
	12+	4316	0	0	0	0	4316
	14+	22060	0	0	13460	21362	56882
	18+	0	0	1434	1676	0	3110
	Sub-total	**31303**	**7238**	**0**	**15136**	**30918**	**89029**
Tiger	14+	0	0	0	2974	0	2974
Trout	**Sub-total**	**0**	**0**	**0**	**2974**	**0**	**2974**
Total		79312	250608	2172	68693	86450	487235

Table 3. Summary of landlocked salmon, brook trout eggs, brown trout eggs and tiger trout eggs produced in FY2016 (fall 2015 and spring 2016).

Hatchery	Species	Size Category (inches)	Number	Weight (Pounds)
Palmer	Landlocked salmon	8+ inches	12030	2998
		12+	5508	4246
Palmer	Brook trout	eggs	60300	N/A
	Brown trout	eggs	403,00	N/A
Sandwich	Brook trout	eggs	73,620	N/A
	Brown trout	eggs	178,10	N/A
	Tiger trout	eggs	104,284	N/A

Anadromous Fish Investigations - Caleb Slater, Ph.D., Project Leader

1. General

In FY 16, MassWildlife hired three 6-month seasonal workers to conduct the Atlantic salmon smolt production assessment work in Connecticut River tributaries and staff the West Springfield fishway on the Westfield River. This work includes stream samples at 50 sites on 45 streams that have been sampled annually as part of the Atlantic Salmon restoration program for the last 20 years-consequentially making these sites the longest continuously sampled streams in the Commonwealth. This electrofishing crew is also used to fill "data gaps" by sampling previously un-sampled streams or re-sampling historic (> 20 years old) sites and aids other Project Leaders or District Biologists by conducting surveys as requested or by combining with other crews for large sites or boat or barge shocking. An additional three 3-month seasonal workers were hired to staff the Essex fishway on the Merrimack River in Lawrence, MA. Holyoke Gas & Electric, as directed by the conditions of their FERC hydroelectric license, hired seasonal employees to staff the Holyoke fishway and Firstlight Power monitored fish passage at the Turners Falls fishways. The Project Leader supervised these activities.

The U.S. Fish and Wildlife Service has withdrawn its support and resources from the Connecticut River Atlantic Salmon restoration program including its egg and fry production at the White River Fish Hatchery and sea run broodstock operations at the Cronin Facility. Both of these USFWS operations were critical components of the program and without them, the Atlantic salmon restoration effort has no real viable chance of success moving forward. Therefore the Massachusetts Division of Fisheries and Wildlife has ended its efforts to restore Atlantic salmon to the Connecticut River after nearly 4 decades of effort. No Atlantic salmon fry were produced at the Roger Reed State Fish Hatchery in Palmer, and no Atlantic salmon fry were stocked in FY 16.

During FY 16, the Project Leader was actively involved in Federal Energy Regulatory Commission (FERC) Hydroelectric proceedings concerning:

- Application for a license at the Pepperell Paper dam on the Nashua River in Pepperell
- Application for a new license at the Watershops Pond Project on the Mill River in Springfield, MA.
- A preliminary permit of the Lake Warner Dam Project on the Mill River
- A preliminary permit of the Cheshire Harbor Project on the Hoosic River
- Amendment of license in preparation to install downstream fish passage protection at the Holyoke Hydroelectric Project on the Connecticut River in Holyoke
- Application for relicensing of the Holyoke City #1 Project on the Holyoke Canal in Holyoke
- Application for relicensing of the Holyoke City #2 Project on the Holyoke Canal in Holyoke
- Application for relicensing of the Holyoke City #3 Project on the Holyoke Canal in Holyoke
- Application for relicensing of the Northfield Mountain Pumped Storage Project on the Connecticut River
- Application for relicensing of the Turners Falls Project on the Connecticut River
- Application for relicensing of the Bear Swamp Pumped storage facility on the Deerfield River
- Application for relicensing of the Fife Brook project on the Deerfield River

The Project Leader worked with the Massachusetts Department of Energy Resources, commenting on the applications of numerous hydroelectric projects seeking to qualify for "Low Impact Hydroelectric Certification" and/or "Green Energy" credits in Massachusetts.

- Holyoke Project, Connecticut River
- Boatlock Project, Holyoke Canal
- Cosgrove Project, Nashua River
- Crocker Dam, Whitman River
- Hunts Pond Project, Millers River
- Loring Road Project, MWRA Aqueduct
- Oakdale Project, MWRA Aqueduct
- West Springfield Project, Westfield River
- Ware Lower Project, Ware River

2. Connecticut River

The Project Leader actively participated in the Connecticut River Atlantic Salmon Commission (CRASC), and continued as the chair of the CRASC Technical Committee. Many telephone, electronic, and written requests for information were also answered by the Project Leader. The FERC Relicensing of 5 hydroelectric projects on the Connecticut River (Northfield MT, Turners Falls, Vernon, Bellow Falls, and Wilder) continued this year. This is a 5 year process that will require close attention.

Because 2016 fish passage operations are ongoing at this time, this report summarizes the 2015 calendar year fish passage activities.

2.1 Holyoke

The City of Holyoke (Holyoke Gas and Electric Co. HG&E) bought the Holyoke Hydroelectric project from Northeast Utilities in 2002. The Project Leader has been involved in ongoing negations with the new owner to settle the out-

standing issues and finalize the FERC license for the project (awarded in 2001). Holyoke Gas and Electric Co., as directed by the conditions of their new FERC hydroelectric license, hired seasonal employees for the Holyoke fishway in spring 2013. The Project Leader supervised their activities.

Fish passage operations commenced on April 27 when water temperatures reached 5°C and river discharge decreased and approached 30,000 cfs. Initially, passage monitoring occurred from 0900 – 1500 h. On May 3, water temperature averaged 9.3°C, and >1,000 American Shad were passed (N = 1,292), triggering fish passage operations from 0800 – 1700 h, followed immediately on May 4 when >2,000 American Shad were passed (N = 5,252), triggering operations from 0800 – 1800 h daily. After the initiation of fish passage operations, the only exception to the passage schedule resulting from high flow occurred on June 3-4. In that event, water temperature decreased to 5.5°C and total river discharge reached 34,000 cfs. Subsequent turbidity yielded poor visibility and prevented observation for, and trapping of, Shortnose Sturgeon and Atlantic Salmon. Operations then continued through June 21 when upstream fish passage was suspended in order to expedite construction of new downstream passage protection measures for Hadley Falls Station. The early shutdown occurred with the agreement of the U.S. Fish and Wildlife Service (USFWS) in consultation with Massachusetts Division of Fisheries and Wildlife and other member agencies of the Connecticut River Atlantic Salmon Commission.

The Holyoke fish passage facility operated for 56 days during in the spring season passing a total of 435,015 anadromous fish (Table 1). One shortnose sturgeon was collected during the spring season. The number of days that passage was greater than 1% of the seasonal total was considerably less than 56. The number of days that passage is greater than 1% of the seasonal total, and the percentage of the total run that these days comprise, is a measure the temporal distribution of the run. The "over-1%-daily-passage" totals were: American shad, 92% of 412,565 in 29 days; blueback herring, 100% of 87 in 24 days; sea lamprey, 92% of 22,245 in 16 days; striped bass, 100% of 21 in 17 days; gizzard shad, 100% of 84 in 28 days (Table 2).

2.1.1 Atlantic Salmon

13 Atlantic salmon were counted during the spring fish passage season and one in the fall at the Holyoke fishlift (Table 2). 2015 passage (13) was 4% of the record passage of 1992, 27% of the previous five year mean, and 18% of the previous ten year mean (Table 3). All salmon were released and allowed to continue their upstream migration. No salmon were radiotagged in 2015.

2.1.2 American Shad

412,565 American were passed upstream. The total number of shad lifted in 2015, including shad transferred to trucks for transport (3,432) and sacrificed for biological sampling and agency studies (861), was 416,949. This was 57% of the record high passage of 1992. 2015 passage was 124% of the previous five year mean, and 171% of the previous ten year mean (Table 3). Examining the cumulative percent of shad passed at Holyoke, 50% of fish passed this project on the 16th day of passage, 14 May (Table 4). A total of 816 American shad were sampled for biological data on 40 days from 1 May through 20 June. Fork length, weight, sex, and scale samples were collected from all individuals. Population age structure of American shad sampled at the Holyoke fishlift 2015 is in Table 4. This represents 0.20% of the total American shad passed for the year and between 0.05% and 18% of the daily shad passage at the facility. The weighted percentage of the run sampled (the total number of fish passed on days of sampling expressed as a percentage of the entire run) was 88%. The weighted sex ratio of American shad lifted at the Holyoke facility in 2015 was 57% males and 43% females.

213 shad were trapped and trucked to the USFWS North Attleboro Fish Hatchery for spawning where 4 million fry were produced. 1.7 million fry were stocked in Charles River, MA, 1.4 million fry were released into the Pawcatuck River, RI, and 900,000 fry were released into the Pawtuxet River, RI.

In 2015, eel ramps were deployed beginning May 13 and were operated until October 29. The study plan was altered for 2015 relative to recent years due to construction of downstream fish passage protection measures for the Hadley Falls Station hydroelectric unit intakes and simultaneous replacement of Hadley Falls Station unit #1 turbine. The eel ramp in the bypass reach on the Holyoke side of the Project was not operated, and the eel ramps in the spillway fish lift entrance channel and upper stilling basin were taken out of service when construction began (21 June) because those areas were dewatered. The eel ramps in the tailrace fish lift entrance channel and in the bypass reach on the South Hadley side of the Project were operated all season, but with altered flow scenarios due to the construction activity. Both Hadley Falls Station hydroelectric units were offline, so attractant flow to the tailrace fish lift structure was limited. Additionally, the Holyoke Dam spill scenario prioritization was changed to prioritize spill from the South Hadley side of the Project resulting in more turbulent flows in the vicinity of the eel ramp there. Additional opportunistic eel collections were made from a leakage area below the Bascule Gate and within a coffer dammed and mostly dewatered area when it was discovered that a large number of eels were retained in that area and aggregated at the leakage.

Juvenile eel passage during 2015 totaled 20,038 eels (Ta-

ble 6), and was the third highest recorded at Holyoke Dam, despite the disruptions that occurred due to construction. Mortality of eels in the trap hoppers was negligible (N = 4). The majority, 41.2%, of eels were collected from the tailrace fish lift entrance channel ramp; 21.9% were collected from the South Hadley ramp; 18.4 % from the upper stilling basin ramp, and only 0.1% from the spillway fish lift entrance channel ramp; 18.4% were collected opportunistically from the Bascule Gate leakage area. The majority of the annual count, 84%, was collected during a protracted period of the summer between May 31 and July 24 when water temperature ranged from about 15–28°C (the seasonal maximum water temperature). Three periods of peak passage occurred throughout the season, May 31 through June 20 (50% of annual total), July 17 through July 24 (29%), and September 17 through September 19 (7%).

2.1.3 Other Anadromous Fish Species

Blueback herring passage in calendar year 2015 was 87 (Table 1). This was 20% of the previous five-year mean and 29% of the previous ten year mean (Table 3).

Sea lamprey passage in 2015 (22,245) was 23% of the record passage of 97,000 in 1998 and was 95% of the previous five-year mean and 80% of the previous ten year mean (Table 3).

Gizzard shad passage in 2015 was 84. This was 18% of the previous five-year mean and 29% of the previous 10 year mean (Table 3).

2.2 Turners Falls

The fishladders at Turners Falls were operated for a total of 57 days from May 6 through July 1, 2015. Operational problems were reviewed as needed on an ongoing basis by agency personnel (Massachusetts Division of Fisheries and Wildlife, and United States Fish and Wildlife Service), and by the dam owner (Firstlight Power).

Upstream fish passage counts were made at the Spillway, Gatehouse, and Cabot fishladders by review of recorded passage. Digital recordings were reviewed by employees of Firstlight Power. All ladders were monitored twenty-four hours each day unless technical problems occurred. All fishladders remained open for passage twenty-four hours each day.

2.2.1 Atlantic Salmon

During the spring/summer migration, 13 adult Atlantic salmon were allowed to pass the Holyoke fish passage facility. 3 of these were documented passing through the Turners Falls fish passage facilities.

2.2.2 American Shad

The number of shad passing the Gatehouse fish ladder in 2015 (58,078) was 97% of the maximum passage of 1992 (Table 7 and 8), 214% of the previous 5 year mean and 389% of the previous 10 year mean.

The number of shad passing the Spillway fish ladder in 2015 (41,835) was 356% of the maximum passage of 1992 (Table 7 and 8), 417% of the previous 5 year mean and 725% of the previous 10 year mean.

The number of shad passing the Cabot fish ladder in 2015 (47,588) was 51% of the maximum passage of 1992 (Table 7 and 8), 121% of the previous 5 year mean and 188% of the previous 10 year mean.

Examining the cumulative percent of shad passed at Gatehouse, 50% of fish passed this ladder on the 23rd day of the migration, 21 May, 2015 (Table 4).

Examining the cumulative percent of shad passed at Spillway, 50% of fish passed this ladder on the 23rh day of the migration, 21 June, 2015 (Table 4).

Examining the cumulative percent of shad passed at Cabot, 50% of fish passed this ladder on the 21stday of the migration, 19 May, 2015 (Table 4).

Only 14% of the shad lifted at Holyoke (412,565) passed the Gatehouse observation window, well below the restoration goal of 50%.

2.2.3 Other Anadromous Fish Species

8,436 Sea Lamprey passed the gatehouse fishway in 2015. This represents 26% of the maximum passage of 2008 (Table 7 and 8), 172% of the previous 5 year mean and 91% of the previous 10 year mean.

3. Westfield River

In 2015 a fish ladder was operated at the A&D Hydroelectric dam in West Springfield, MA. The fishway and associated downstream bypass facilities were constructed in the fall of 1995.

Five species of anadromous fish and six species of resident fish were identified and enumerated during the spring/summer fish passage season (Table 9).

50% of the American shad passage had occurred by the 22th day of the run, May 18 (Table 11.)

An eelway for upstream passage of juvenile American eel was constructed in the lower section of the fishway in August of 2001. The eelway was nonoperational and was re-

placed by a new structure in 2015.

3.1 Anadromous fish
The West Springfield fish passage facility operated for 93 days in the spring of 2015. The number of days that passage was greater than 1% of the seasonal total was considerably less than 93. The number of days that passage is greater than 1% of the seasonal total, and the percentage of the total run that these days comprise, is a measure the temporal distribution of the run. The "over-1%-daily-passage" totals were: American shad, 89 % of 3,383 in 28 days; sea lamprey, 90% of 218 in 21 days; Atlantic salmon, 100% of 3 in 3 days (Table 9).

During the spring/summer season 3 Atlantic salmon trapped transported by Division personnel to the East Branch of the Westfield River upstream of the Knightville Dam.

A total of 3,383 American Shad; 3 Atlantic salmon; 218 Sea Lamprey; 0 Striped Bass; 0 Blueback Herring (Table 1); and 0 Gizzard Shad were passed upstream in spring/summer 2015 (Table 8). The 2015 shad passage was 33% of the record high of 10,373 in 2012 (Table 10).

3.2 Non-anadromous fish
White sucker, brook trout, brown trout, rainbow trout, tiger trout, and smallmouth bass were documented passing upstream through the West Springfield fish passage facility in 2015

4. Merrimack River

4.1 Essex Dam
The Essex Dam fish elevator operated for 89 days between 20 April and 17 July 2015. For the fall season the fishway was operated from 15 September through 1 November. During the spring migration period the Essex Dam fish elevator was operated seven days per week. Hours of operation were generally 8:00 a.m. to 4:00 p.m. throughout the season. During the fall four lifts were made per weekday.

Daily fish passage numbers for the 2015 fish passage season are summarized in Table 12. Annual fish passage numbers for the period of record (1982-2014) are summarized in Table 13.

4.1.1 Atlantic salmon:
13 adult Atlantic Salmon were lifted at the Essex fishlift during spring 2015. This was 3.2% of the record passage of 2011. Salmon returns were 9.5% of the previous 5 year mean, and 12.5% of the previous 10 year mean. No salmon were captured in the fall.

4.1.2 American Shad:
The total number of shad lifted in 2015 (89,592) was a record high (Table 13). 2015 shad passage was 120% of the previous five year mean (Table 14) and 380% of the previous ten year mean (Table 13). 421 shad were trapped and trucked to the USFWS Nashua Fish Hatchery for spawning where 2.3 million fry were produced, all were stocked into the Merrimack River. 357 shad were sampled for biological data collection over 20 days between May 8 and July 9.

4.1.3 River Herring:
2015 passage was 128,692, this was 34% of the record high passage of 1991 (Table 13). 2015 herring passage was 1050% of the previous five year mean (Table 14) and 1970% of the previous ten year mean (Table 13). 446 River herring were sampled for biological data collection over 4 days between May 9 and May 26.

4.1.4 Other Anadromous Fish:
Total number of sea lamprey, striped bass, and gizzard shad passing through the Lawrence fishlift were 5,035, 247, and 26 respectively.

4.1.5 American Eel
An estimated 6,647 eels were passed in the lift hopper and 8,124 passed the new permanent eelway at the dam for a total of 14,771.

4.2 Pawtucket Dam
Operation of the Pawtucket Dam fish elevator began (9 May) one week after shad began passing at the Lawrence fishway, approximately 12 miles downstream, and concluded on July 17. The system was operated seven days per week, generally from 7:00 a.m. to 6:00 p.m. Frequency of lifts varied between 0.5 to 2 hours based on the density of fish observed in the hopper bucket. Estimates of fish passage were made by CHI employees who observed the hopper bucket during each lift.

Maintenance of the facility was satisfactory throughout the fish passage season.

The estimated total number of American shad passed at the Lowell facility in 2015 was 31,686 (Table 14), this represents 27% of the shad passing through the Lawrence fishway this season. While not the 50% goal it is significantly better than the average. Enel will continue to experiment with the floating screen in the tailrace- designed to guide fish to the fishway entrance.

Table 15 lists the annual runs of anadromous fish counted at the facility from 1986, the first year of operation, through 2014.

16 sea-run Atlantic salmon were seen at the Lowell fishlift. All sea-run Atlantic salmon that entered the Lawrence fishlift were allowed to pass upstream as they are no longer required for broodstock.

Assorted riverine species have been noted but not counted.

5. Atlantic Salmon Restoration program

The collective efforts of the states of Vermont, New Hampshire, Massachusetts, Connecticut and the United States Fish and Wildlife Service to restore Atlantic salmon to the Connecticut River Basin ended in FY 13 after nearly 4 decades.

The underpinning of the Connecticut River salmon restoration program were the millions of eggs and fry produced by the U.S. Fish and Wildlife Service's White River National Fish Hatchery in Bethel, VT and sea run brood stock management and spawning operations at the Cronin National Salmon Station in Sunderland, MA. In August 2011 Tropical Storm Irene severely damaged the White River Hatchery leading to its depopulation and closure in early 2012. This event and continued disappointing returns of adult Atlantic salmon to the Connecticut River led the U.S. Fish and Wildlife Service to withdraw its support and resources from the Connecticut River Atlantic Salmon restoration program in July 2012. As a result the number of fry available for stocking was dramatically reduced in both 2012 and 2013 and the last Atlantic salmon fry and smolts were stocked in 2013.

The U.S. Fish and Wildlife Service egg/fry production and broodstock management operations were critical components of the restoration program and without them, the restoration effort has no real viable chance of success moving forward. Therefore, at its November 2012 meeting the Division's board accepted the staff's recommendation to end MassWildlife's efforts to restore Atlantic salmon to the Connecticut River. The last Atlantic salmon fry were stocked out of Roger Reed Hatchery in April 2013 and all remaining broodstock Atlantic salmon were stocked out as well.

In June of 2013 the USFWS informed the MassWildlife that it will also be withdrawing its support and resources from the Merrimack River Atlantic Salmon restoration program.

6. Atlantic Salmon Fry Survival

Selected salmon stocked streams were sampled for juvenile Atlantic salmon stocked in 2013. In 2015 49 sites on 44 streams were sampled by personnel from the Massachusetts Division of Fisheries and Wildlife (Table 16).

A single-pass technique utilizing a battery powered backpack shocker was employed on all streams sampled. All fish seen were captured. Fish were held in live cars after capture, identified to species, and measured for total length. Upon completion of subsequent 'work up', all fish were released back into the index site. Index sites were selected to be proportionately representative of the habitat types in each stream. To prevent over or under estimation due to disproportionate stocking, index sites were selected, whenever possible, near the middle of a stocking section. The area of stream sampled was obtained by measuring the length of the sampled section and multiplying by the mean width for that section. Total units sampled are listed in Table 15.

Population estimates for each age class were obtained by expanding the number of salmon captured by the historical sample efficiency at each site (calculated in past multi-pass depletion samples). Survival was calculated by dividing the population estimate for that year class by the number of units surveyed multiplied by the stocking density of that year class. An estimate of spring 2016 smolt production was produced by multiplying the population estimate of 2+ salmon by the estimated over-winter survival (0.6) (Table 16).

Table 1. Seasonal totals of Anadromous Species by fish passage facility for 2015.

Facility	American Shad	Sea Lamprey	Blueback Hering	Striped Bass	Gizzard Shad	Alantic Salmon	total
Holyoke River							
West Springfield	3,383	218	-	-	-	3	3,604
Holyoke	412,565	22,245	87	21	84	13	435,015
Cabot	47,588					3	47,591
Spillway	41,835						41,835
Gatehouse	58,078	8,436					66,514
Merrimack River							
Essex	89,592	5,035	128,692	247	26	13	223,605
Pawtucket	31,686	208	20,937		0	16	52,847

Table 2. Daily anadromous fish passage at Holyoke 2015.

Date	American Shad	Blueback Herring	Sea Lamprey	Striped Bass	Atlantic Salmon	Gizzard Shad
	4/1 - 4/5 no lifting due to low temperature					
	4/6 - 4/14 - no lifting due to canal outage					
	4/15 - 4/26 - no lifting due to high flows					
27-Apr	0	0	0	0	0	0
28-Apr	0	0	0	0	0	0
29-Apr	1	0	0	0	0	0
30-Apr	18	0	0	0	0	0
1-May	28	0	0	0	0	0
2-May	15	0	0	0	0	0
3-May	1,292	0	0	0	0	0
4-May	5,252	0	2	0	1	0
5-May	4,754	0	24	0	0	0
6-May	10,239	0	25	0	0	0
7-May	9,394	5	182	1	0	1
8-May	15,399	3	272	0	0	1
9-May	24,779	2	280	0	0	0
10-May	41,940	6	1,032	0	0	2
11-May	40,928	9	2,452	1	1	2
12-May	26,772	7	3,589	0	1	6
13-May	13,101	1	142	0	0	3
14-May	20,179	3	119	1	0	2
15-May	9,463	0	73	0	0	0
16-May	5,779	1	62	0	0	0
17-May	11,605	1	303	0	0	0
18-May	21,198	5	1,684	0	2	0
19-May	7,360	1	608	0	1	0
20-May	14,333	1	213	0	0	1
21-May	3,937	0	136	0	0	5
22-May	10,066	11	1,630	0	0	8
23-May	11,988	2	336	0	0	1
24-May	8,110	2	1,599	0	0	0
25-May	8,405	0	1,199	0	1	2
26-May	9,510	3	1,577	0	0	7
27-May	7,279	9	1,969	0	0	4
28-May	5,315	3	1,834	0	0	1
29-May	5,875	0	529	1	0	3
30-May	3,298	5	166	1	0	3
31-May	1,732	1	88	0	0	0
1-Jun	3,474	0	9	0	2	3
2-Jun	815	3	16	1	0	3
3-Jun						
4-Jun						
5-Jun	5,129	0	7	0	0	8
6-Jun	8,969	0	8	2	0	5

Table 2 continued on next page.

Table 2 continued from previous page.

7-Jun	3,296	0	12	1	1	1
8-Jun	4,324	1	12	1	0	1
9-Jun	11,297	0	19	1	0	2
10-Jun	3,852	0	24	0	0	5
11-Jun	2,526	0	3	2	0	0
12-Jun	2,800	0	1	1	0	0
13-Jun	960	2	3	0	0	0
14-Jun	1,485	0	1	2	0	1
15-Jun	887	0	1	2	1	1
16-Jun	183	0	2	1	1	0
17-Jun	212	0	0	0	0	0
18-Jun	709	0	0	1	0	2
19-Jun	160	0	1	1	0	0
20-Jun	1,798	0	0	0	1	0
21-Jun	436	0	1	0	0	0
Totals	**412,656**	**87**	**22,245**	**21**	**13**	**84**
	American Shad	**Blueback Herring**	**Sea Lamprey**	**Striped Bass**	**Atlantic Salmon**	**Gizzard Shad**

The Westfield River Fish Ladder in West Springfield.

Table 3. Anadromous fish passage recorded at the Holyoke fishlift, Connecticut River, Massachusetts 1955-2015

Year	American Shad	Blueback Herring	Atlantic Salmon	Striped Bass	Sea Lamprey	Gizzard Shad	Year	American Shad	Blueback Herring	Atlantic Salmon	Striped Bass	Sea Lamprey	Gizzard Shad
1955	4,900	-	-	-	-	-	1986	350,000	520,000	260	187	20,000	27
1956	7,700	-	-	-	-	-	1987	280,000	360,000	208	521	23,000	94
1957	8,800	16	1	-	-	-	1988	290,000	340,000	72	256	16,000	95
1958	5,700	29	1	-	2	-	1989	350,000	290,000	80	923	15,000	294
1959	15,000	20	-	-	73	-	1990	360,000	390,000	188	1,000	22,000	956
1960	15,000	796	2	-	17	-	1991	520,000	410,000	152	1,200	41,000	486
1961	23,000	1,200	-	-	42	-	1992	720,000	310,000	368	327	28,000	1,100
1962	21,000	19	-	-	209	-	1993	340,000	100,000	167	194	23,000	341
1963	31,000	32	-	-	64	-	1994	181,000	32,000	256	159	30,000	165
1964	35,000	13	-	-	537	-	1995	190,000	110,000	150	1,300	18,000	2,000
1965	34,000	53	-	-	26	-	1996	276,000	55,000	202	537	45,000	1,100
1966	16,000	54	-	-	2	-	1997	299,000	64,000	94	679	32,000	2,100
1967	19,000	356	-	-	46	-	1998	316,000	11,000	196	492	97,000	1,100
1968	25,000	-	-	-	-	-	1999	194,000	2,700	91	859	20,000	35,000
1969	45,000	10,000	-	-	-	-	2000	225,000	11,000	50	489	21,000	38,000
1970	66,000	1,900	-	-	-	-	2001	273,000	11,000	25	1,200	49,000	5,500
1971	53,000	302	-	-	-	-	2002	375,000	2,000	34	1,100	74,000	3,100
1972	26,000	188	-	-	-	-	2003	287,000	2,700	28	881	53,000	859
1973	25,000	302	-	-	-	-	2004	191,000	145	34	259	59,000	287
1974	53,000	504	-	-	-	-	2005	117,000	534	131	233	28,000	132
1975	110,000	1,600	-	-	23,000	-	2006	155,000	21	118	144	18,000	127
1976	350,000	4,700	-	-	32,000	-	2007	159,000	75	106	243	40,000	75
1977	200,000	33,000	2	-	52,000	-	2008	153,000	84	80	617	57,000	127
1978	140,000	38,000	23	-	43,000	-	2009	161,000	40	61	668	19,000	68
1979	260,000	40,000	19	103	31,000	-	2010	164,000	76	41	298	40,000	371
1980	380,000	200,000	126	148	34,000	-	2011	244,000	138	72	138	19,000	423
1981	380,000	420,000	319	510	53,000	-	2012	495,000	39	29	336	14,000	337
1982	290,000	590,000	11	231	26,000	-	2013	393,000	976	69	250	22,000	827
1983	530,000	450,000	25	346	29,000	-	2014	373,000	976	27	69	22,000	410
1984	500,000	480,000	66	110	22,000	-	2015	412,565	87	13	21	22,245	84
1985	480,000	630,000	285	369	40,000	-							

Table 4. Temporal characteristics of American shad passage at the Holyoke and Turners Falls fish passage facilities, 2015

Cumulative Percentage of Total American Shad Passage

Passage Facility	Day of Highest Passage	25%	50%	75%	90%	Daily Passage
Holyoke Fishlift:						
	Day*	12	20	29	39	12
	Date	5/10	5/18	5/27	6/6	5/10
Spillway Fishladder (Turners Falls):						
	Day*	17	23	30	37	14
	Date	5/15	5/21	5/28	6/4	5/12
Gatehouse Fishladder (Turners Falls):						
	Day*	17	22	30	34	15
	Date	5/15	5/20	5/28	6/1	5/13
Cabot Fishladder (Turners Falls):						
	Day*	14	21	30	34	14
	Date	5/12	5/19	5/28	6/1	5/12

* Day one is 29 April the first day shad were lifted at the Holyoke fish passage facility.

Table 5. Population age structure of American shad sampled at the Holyoke fishlift 2015. (from CT DEP)

2015 American Shad Age Structure at the Holyoke Lift							
Age	3	4	5	6	7	Total	% Repeat Spawn
%Bucks	2.30%	20.70%	62.20%	14.40%	0.50%		1.80%
Shad (n)	5,278	48,555	145,666	33,778	1,056	234,332	
		4	5	6	7		% Repeat Spawn
%Roes		6.10%	65.90%	27.10%	0.90%		2.20%
Shad (n)		10,902	117,585	48,280	1,557	178,324	
	3	4	5	6	7		% Repeat Spawn
% Combined	1.10%	13.30%	63.90%	20.80%	0.70%		2.00%
Shad (n)	5,278	59,457	263,251	82,057	2,613	412,656	

Table 6. Holyoke Dam upstream American eel passage monitoring, 2015.

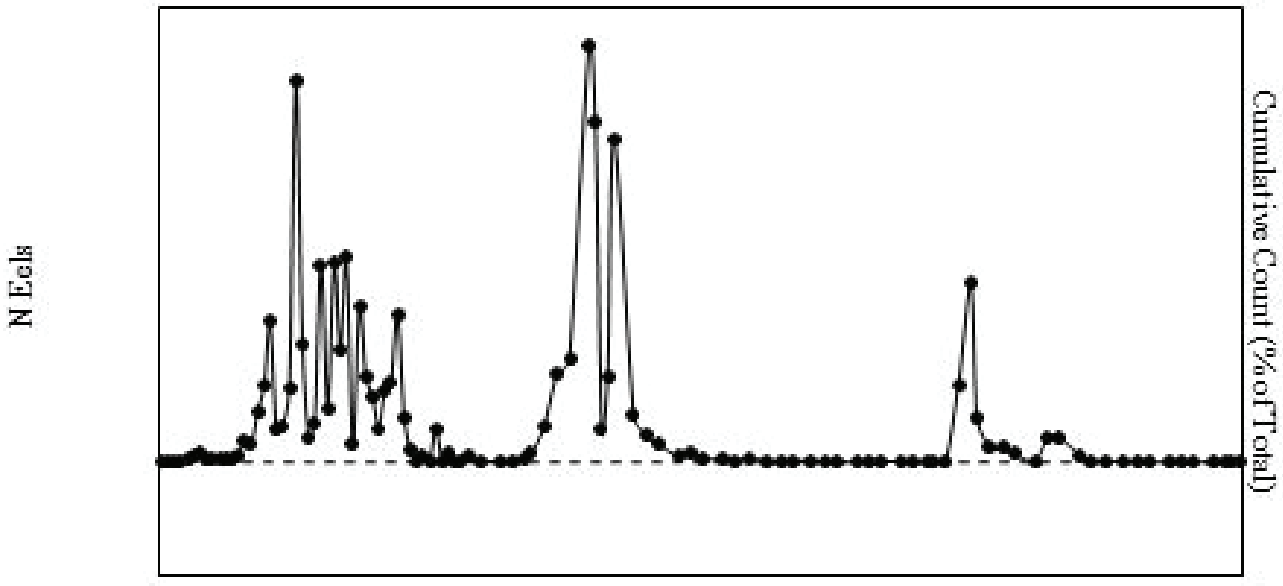


Table 7. 2015 Daily Fish Passage through the Turners Falls Fish Passage Complex.

	Gatehouse			Cabot	Spillway
	Shad	Lamprey	Salmon	Shad	Shad
Date	Daily	Daily	Daily	Daily	Daily
5/6/2015				66	
5/7/2015				339	2
5/8/2015	7	0	0	603	9
5/9/2015	701	5	0	1565	554
5/10/2015	1252	4	0	1787	644
5/11/2015	588	9	0	2557	737
5/12/2015	1349	101	0	5066	1196
5/13/2015	6395	237	0	3426	4414
5/14/2015	2529	172	1	1748	2318
5/15/2015	2993	99	0	2690	1815
5/16/2015	1904	31	0	1601	1207
5/17/2015	4782	140	0	870	1506
5/18/2015	2986	166	0	791	2087
5/19/2015	2755	210	0	964	2645
5/20/2015	998	149	0	1185	1253
5/21/2015	1289	114	0	805	1046
5/22/2015	1405	75	0	793	646
5/23/2015	1082	131	0	799	1143
5/24/2015	1639	412	1	1261	1482
5/25/2015	3104	365	0	2248	1886
5/26/2015	1954	374	0	2469	1262
5/27/2015	2887	556	0	1724	1393
5/28/2015	2778	835	0	1841	2538
5/29/2015	2590	1337	0	1537	2307
5/30/2015	2326	1511	1	1382	1637
5/31/2015	1492	949	0	1869	1204
6/1/2015	715	192	0	990	503
6/2/2015	47	64	0	22	3
6/3/2015	6	1	0	0	2
6/4/2015	233	0	0	1	17
6/5/2015	29	1	0	19	6
6/6/2015	130	1	0	77	11
6/7/2015	211	2	0	135	12
6/8/2015	85	1	0	403	68
6/9/2015	769	45	0	429	527
6/10/2015	649	52	0	719	320
6/11/2015	NC	0	0	389	172
6/12/2015	1376	4	0	536	1745
6/13/2015	940	32	0	529	650
6/14/2015	475	16	0	527	340
6/15/2015	150	20	0	297	106
6/16/2015	313	4	0	147	188
6/17/2015	132	6	0	58	96
6/18/2015	NC	0	0	61	71
6/19/2015	NC	0	0	51	27
6/20/2015	NC	0	0	60	4
6/21/2015	NC	0	0	20	10
6/22/2015	9	3	0	116	8
6/23/2015	4	2	0	9	2
6/24/2015	1	0	0	5	0
6/25/2015	2	2	0	1	2
6/26/2015	7	1	0	0	3
6/27/2015	4	1	0	1	7
6/28/2015	0	3	0	0	4
6/29/2015	5	0	0	0	0
6/30/2015	1	1	0	0	0
7/1/2015	1		0	0	0
	58,079	8,436	3	47,588	41,835
	Gatehouse			Cabot	Spillway
	Shad	Lamprey	Salmon	Shad	Shad
	Daily	Daily	Daily	Daily	Daily

NC = No count. The reviewable portion of the video files from was incomplete and very short, typically spanning a few minut The cause of the truncation is unknown.

Table 8. Historic Fish Passage Numbers for the Turners Falls Project

Year	Location	American Shad	Blueback Herring	Striped Bass	Sea Lamprey	Atlantic Salmon	Gizzard* Shad	
1980	Cabot	687	0	11	187	0		
	Spillway	5	0	0	0	0		
	Gatehouse	298	0	1	66	1		
1981	Cabot	224	0	0	1,622	7		
	Spillway**							
	Gatehouse	200	0	0	935	8		
1982	Cabot							
	Spillway**							
	Gatehouse	11	4	0	210	0		
1983	Cabot	26,697	106	6	859	0		
	Spillway	263	1	1	649	0		
	Gatehouse	12,705	28	7	703	0		
1984	Cabot	1,831	4	0	334	1		
	Spillway	4,563	12	0	851	1		
	Gatehouse	4,333	21	0	683	1		
1985	Cabot	31,000	1,726	0	3,198	2		
	Spillway	843	243	0	3,185	3		
	Gatehouse	3,855	301	0	1,809	3		
1986	Cabot	22,144	7,091	0	1,424	5		
	Spillway	5,857	6,248	0	2,230	4		
	Gatehouse	17,858	9,578	0	1,961	10		
1987	Cabot	33,114	2,866	0	1,324	2		
	Spillway	3,679	2,841	0	2,921	3		
	Gatehouse	18,959	5,091	0	2,590	12		
1988	Cabot	28,546	349	0	335	2		
	Spillway	3,354	865	0	1,912	2		
	Gatehouse	15,787	1,079	0	1,175	7		
1989	Cabot	14,403	199	0	578	1		
	Spillway	1,494	279	0	947	0		
	Gatehouse	9,511	510	1	868	2		
1990	Cabot	31,056	711	0	1,304	8	1	
	Spillway	5,898	768	0	1,013	2	0	
	Gatehouse	27,908	1,585	0	1,301	16	13	
1991	Cabot	87,168	6,433	1	2,089	2	0	
	Spillway	6,282	2,718	0	3,026	2	0	
	Gatehouse	54,656	7,522	3	4,090	4	1	
1992	Cabot	94,046	1,765	1	1,836	9	0	
	Spillway	11,760	884	0	3,275	6	0	
	Gatehouse	60,089	2,157	2	2,710	14	7	
1993	Cabot	21,045	243	0	711	7	0	
	Spillway	898	90	0	2,082	3	0	
	Gatehouse	10,221	278	0	1,637	7	0	
1994	Cabot**							
	Spillway	1,507	17	0	1,740	1	0	
	Gatehouse	3,729	97	0	1,702	5	0	
1995	Cabot	33,938	4,234	0	1,417	2	1	
	Spillway	543	31	0	1,372	0	0	
	Gatehouse	18,369	2,957	0	1,813	4	4	

1996	Cabot**						
	Spillway	2,293	13	0	2,651	4	0
	Gatehouse	16,192	515	0	4,556	3	3
1997	Cabot	22,518	231	0	2,374	2	4
	Spillway	3,473	15	0	2,219	1	3
	Gatehouse	9,216	128	0	2,265	2	2
1998	Cabot	14,947	2	0	8,707	6	1
	Spillway	4,721	0	0	8,642	2	2
	Gatehouse	10,527	4	0	7,579	5	2
1999	Cabot	11,501	5	0	2,014	2	543
	Spillway	4,215	0	8	1,449	2	440
	Gatehouse	6,751	2	0	916	0	275
2000	Cabot	12,289	0	0	1,455	0	9
	Spillway	2,240	0	0	1,962	4	358
	Gatehouse	2,590	0	0	1,350	5	199
2001	Cabot	20,933	0	0	3,678	0	0
	Spillway	2,344	0	0	5,280	0	0
	Gatehouse	1,540	0	0	2,144	0	0
2002	Cabot	7,922	0	0	14,709	0	0
	Spillway	5,372	0	0	12,367	0	0
	Gatehouse	2,870	0	0	10,160	0	0
2003**							
2004	Cabot	5,933	0	0	13,352	0	0
	Spillway	1,980	0	0	5,821	0	0
	Gatehouse	2,192	0	0	8,418	0	0
2005	Cabot	5,404					
	Spillway	1,626					
	Gatehouse	1,581					
2006	Cabot	11,991	1	198	5,377	4	9
	Spillway	2,577	0	153	5,133	8	0
	Gatehouse	1,810	0	46	3,005	7	0
2007	Cabot	11,130 **	**		11,061	5	**
	Spillway	1,793 **	**		5,555	3	**
	Gatehouse	2,248 **	**		15,438	5	**
2008	Cabot	15,089 **	**	**		6 **	
	Spillway	627 **	**	**		5 **	
	Gatehouse	3,995 **	**		32,035	10 **	
2009	Cabot	13,391 **	**	**		0 **	
	Spillway	919 **	**	**		5 **	
	Gatehouse	3,814 **	**		8,296	8 **	
2010	Cabot	30,232 **	**	**		**	
	Spillway	2,735 **	**	**		**	
	Gatehouse	16,768 **	**		6,352	8 **	
2011	Cabot	27,077 **	**	**		2 **	
	Spillway	1,966 **	**	**		6 **	
	Gatehouse	16,798 **	**		2,032	7 **	
2012	Cabot	51,901 **	**	**		2 **	
	Spillway	10,608 **	**	**		3 **	
	Gatehouse	26,727 **	**		4,503	1 **	
2013	Cabot	46,886 **	**	**		**	
	Spillway	10,571 **	**	**		**	
	Gatehouse	35,494 **	**		6,016	**	

2014	Cabot	40,666 **	**	**		3 **
	Spillway	24,262 **	**	**		8 **
	Gatehouse	39,914 **	**		5,553	11 **
2015	Cabot	47,588 **	**	**		3 **
	Spillway	41,835 **	**	**		**
	Gatehouse	58,078 **	**		8,436	**

* 1990 was the first year gizzard shad observed using the ladders was recorded.

** Not monitored

Table 9. Daily Fish Counts West Springfield Fish Ladder 2015

Table 9. Daily Fish Counts - West Springfield Fish Ladder 2015

Date	American Shad	Sea Lamprey	Atlantic Salmon	White Sucker	Small-mouth	Brown Trout	Rainbow Trout	Brook Trout	Tiger Trout	Max. H2O Temp. (F°)
12-Apr	0	0	0	0	0	0	0	0	0	37
13-Apr	0	0	0	0	0	0	0	0	0	42
14-Apr	0	0	0	0	0	0	0	0	0	42
15-Apr	0	0	0	0	0	0	0	0	0	43
16-Apr	0	0	0	0	0	0	0	0	0	43
17-Apr	0	0	0	1	0	0	0	0	0	42
18-Apr	0	0	0	3	0	0	0	0	0	44
19-Apr	0	0	0	152	0	0	0	0	0	48
20-Apr	0	0	0	3	0	0	0	0	0	44
21-Apr	0	0	0	8	0	0	0	0	0	46
22-Apr	0	0	0	0	0	0	0	0	0	46
23-Apr	0	0	0	0	0	0	0	0	0	45
24-Apr	0	0	0	0	0	0	0	0	0	42
25-Apr	0	0	0	0	0	0	0	0	0	42
26-Apr	0	0	0	0	0	0	0	0	0	46
27-Apr	4	0	0	0	0	0	0	0	0	46
28-Apr	0	0	0	9	0	0	0	0	0	50
29-Apr	3	0	0	24	0	0	0	0	0	55
30-Apr	5	0	0	42	1	0	0	0	0	57
1-May	2	0	0	25	0	0	0	0	0	53
2-May	0	0	0	30	1	0	0	0	0	57.2
3-May	1	2	0	35	4	0	0	0	0	57.2
4-May	31	3	0	1051	20	0	0	0	0	59
5-May	42	8	0	116	13	3	0	0	0	59.9
6-May	40	21	0	175	14	1	0	1	0	61.7
7-May	123	16	0	33	18	0	0	0	0	62.6
8-May	125	22	0	52	21	0	0	1	1	64.4
9-May	122	16	0	99	22	1	0	2	0	66.2
10-May	147	5	0	19	35	4	0	0	2	69.8
11-May	179	15	0	49	24	1	1	2	1	71.6
12-May	250	6	0	41	22	1	0	0	5	73.4
13-May	130	8	0	3	14	2	0	1	1	67.5
14-May	76	1	0	0	4	1	0	0	1	64.4
15-May	41	1	0	0	1	0	0	0	0	63.5
16-May	55	4	0	0	13	1	0	0	1	63.5
17-May	118	3	0	3	8	0	0	1	0	66.2
18-May	213	12	0	15	17	0	0	1	3	69.8
19-May	65	5	0	7	5	5	0	0	0	66.2
20-May	156	5	0	7	8	3	0	1	1	65.3
21-May	74	0	0	1	2	1	0	1	0	63.5
22-May	59	2	0	1	3	0	0	0	0	62.6
23-May	20	0	0	0	1	0	0	0	0	61.7

24-May	27	0	0	0	2	0	0	1	0	62.6
25-May	134	2	0	1	4	0	0	1	0	64.4
26-May	118	2	0	1	8	1	0	0	0	66.2
27-May	208	3	0	0	3	0	0	1	0	69.8
28-May	260	15	0	0	9	4	1	1	1	73.4
29-May	60	1	0	2	6	1	1	1	0	73.4
30-May	20	4	1	5	1	1	0	1	0	74.3
31-May	36	1	0	1	4	0	0	1	0	72.5
1-Jun	31	7	0	1	0	0	0	0	0	66.2
2-Jun	0	0	0	0	0	0	0	0	0	59
3-Jun	0	0	0	0	0	0	0	0	0	53.6
4-Jun	0	1	0	1	0	1	0	0	0	60.8
5-Jun	77	1	0	14	3	0	0	4	0	64.4
6-Jun	18	0	0	0	1	0	0	4	1	64.4
7-Jun	47	0	0	1	0	0	0	4	0	68
8-Jun	25	1	0	0	2	0	0	1	0	64.4
9-Jun	28	0	1	0	1	0	0	1	0	68
10-Jun	46	8	0	0	0	1	0	0	0	68
11-Jun	50	10	0	8	0	0	0	1	0	71.6
12-Jun	17	2	0	4	3	0	0	1	0	71.6
13-Jun	33	1	0	0	1	2	0	0	0	71.6
14-Jun	25	1	0	0	2	1	0	0	0	75.2
15-Jun	0	0	0	0	0	1	0	0	0	no data
16-Jun	0	2	0	1	0	2	0	0	0	62.6
17-Jun	1	0	1	0	0	1	0	0	0	64.4
18-Jun	3	1	0	2	1	0	1	0	0	64.4
19-Jun	15	0	0	0	2	2	0	0	0	no data
20-Jun	6	0	0	0	1	0	0	0	0	68
21-Jun	7	0	0	2	0	0	0	0	0	68
22-Jun	0	0	0	0	0	0	0	0	0	no data
23-Jun	2	0	0	7	2	4	0	0	0	69.8
24-Jun	1	0	0	6	3	3	0	0	0	71.6
25-Jun	6	0	0	0	0	1	0	0	0	71.6
26-Jun	0	0	0	0	1	0	0	0	0	71.6
27-Jun	0	0	0	0	0	0	0	0	0	69.8
28-Jun	0	0	0	0	0	0	0	0	0	64.4
29-Jun	0	0	0	0	0	0	0	0	0	59
30-Jun	0	0	0	2	0	1	0	0	0	66.2
1-Jul	0	0	0	0	0	0	0	0	0	63.5
2-Jul	0	0	0	1	0	0	0	0	0	63.5
3-Jul	0	0	0	0	2	0	0	0	0	68.9
4-Jul	0	0	0	0	0	0	0	0	0	no data
5-Jul	0	0	0	0	0	0	0	0	0	66.2
6-Jul	0	0	0	0	1	1	0	0	0	68.9
7-Jul	0	0	0	0	1	0	0	0	0	69.8
8-Jul	0	0	0	1	4	1	0	0	0	71.6
9-Jul	1	0	0	0	1	0	0	0	0	68.9
10-Jul	0	0	0	0	1	1	0	0	1	69.8
11-Jul	0	0	0	0	0	0	0	0	0	no data
	3,383	218	3	2,065	341	54	4	34	19	
	American Shad	Sea Lamprey	Atlantic Salmon	White Sucker	Small-mouth	Brown Trout	Rainbow Trout	Brook Trout	Tiger Trout	

Table 10. Historic yearly passage totals, Westfield River fish passage facility, West Springfield, Massachusetts, 1992-2015.

Date	American Shad	Bluebac Herring	Sea Lamprey	Striped Bass	Atlantic Salmon	Gizzard Shad	White Sucker	Small-mouth	Brown Trout	Rainbow Trout	Brook Trout	Tiger Trout
*1992					2							
*1993					10							
*1994					7							
*1995					6							
1996	1,413	1	4,699	-	19	-	4,699	110	12	91	7	-
1997	1,012	-	2,255	-	37	-	2,255	64	77	8	12	-
1998	2,292	2	1,756	5	47	1	5,515	149	210	18	42	44
1999	2,668	-	643	-	17	1	1,227	109	162	3	23	103
2000	3,558	-	2,040	-	11	122	3,158	207	77	9	9	44
2001	4,720	2	2,345	2	8	-	3,735	129	116	18	8	34
2002	2,762	4	3,638	2	5	1	2,242	146	160	9	14	90
2003	1,957	5	404	-	6	-	1,832	155	90	2	4	29
2004	913	1	1,171	-	12	-	2,789	148	77	8	6	75
2005	1,237	0	818	0	27	0	1,161	201	58	29	5	28
2006	1,534	0	1,276	1	34	0	3,447	188	39	10	7	69
2007	4,497	0	1,797	0	21	0	2,280	133	44	11	15	21
2008	3,212	0	1,220	0	30	0	1,757	246	34	0	11	6
2009	1,395	0	538	0	2	0	1,865	260	21	15	5	7
2010	3,444	4	447	0	3	0	954	185	24	2	11	21
2011	5,029	0	1,590	0	9	0	1,544	496	24	10	5	38
2012	10,373	3	392	0	6	176	1,529	326	50	6	13	34
2013	4,938	0	729	0	11	0	1,241	620	37	3	11	56
2014	4,787	4	1,127	0	2	0	1,663	290	65	15	33	59
2015	3,383	0	218	0	3	0	2,065	341	54	4	34	19

*1992-1995 Adult salmon were netted at the base of the dam.

Table 11. Temporal characteristics of American shad passage at the West Springfield fish passage facility, 2015

Cumulative Percentage of Total American Shad Passage

	Day of Highest Percent Passage	25%	50%	75%	90%	Daily Passage
Day*	16	22	31	40	32	
Date	5/12	5/18	5/27	6/5	5/28	

*Day one is April 27, the first day of shad passage.

Table 12. 2015 Anadromous Fish Passage at Essex Dam, Lawrence, MA

	Atlantic salmon	American shad	River herring	Sea lamprey	Gizzard shad
15-Apr	0	0	0	0	0
16-Apr	0	0	0	0	0
17-Apr	0	0	0	0	0
18-Apr	0	0	0	0	0
19-Apr	0	0	0	0	0
20-Apr	0	0	0	0	0
21-Apr	0	0	0	0	0
22-Apr	0	0	0	0	0
23-Apr	0	0	0	0	0
24-Apr	0	0	0	0	0
25-Apr	0	0	0	0	0
26-Apr	0	0	0	0	0
27-Apr	0	0	0	0	0
28-Apr	0	0	1	0	0
29-Apr	0	0	0	0	0
30-Apr	0	0	0	0	0
1-May	0	0	0	1	0
2-May	0	0	0	0	0
3-May	0	0	1	1	0
4-May	0	2	13	11	0
5-May	0	10	6	2	0
6-May	0	13	2	10	0
7-May	0	27	0	49	0
8-May	0	149	2414	123	0
9-May	0	229	7357	37	0
10-May	0	216	17024	248	0
11-May	0	1393	17621	139	0
12-May	0	1575	4627	247	0
13-May	0	1651	17495	457	0
14-May	0	564	6840	299	0
15-May	0	1350	3199	137	0
16-May	0	1725	14877	136	1
17-May	0	1936	970	302	0
18-May	0	1652	5387	191	0
19-May	1	1564	55	235	0
20-May	0	3052	6647	397	0
21-May	0	2821	563	181	2
22-May	0	5845	2865	62	1
23-May	0	3165	2744	114	0
24-May	0	3028	3514	213	2
25-May	0	4020	598	58	1
26-May	2	3391	2237	236	3
27-May	2	3888	3721	301	0
28-May	0	2992	1803	216	0
29-May	0	2817	3784	114	0
30-May	1	1963	1688	267	3
31-May	1	1693	324	137	3
1-Jun	0	2210	230	24	0
2-Jun	0	285	40	4	0
3-Jun	0	3	5	1	0
4-Jun	0	174	8	3	0
5-Jun	0	435	0	4	1
6-Jun	0	1089	1	7	0
7-Jun	0	2215	3	10	1
8-Jun	0	2035	2	9	1
9-Jun	0	2871	0	3	1
10-Jun	0	3666	3	25	0
11-Jun	0	2404	7	16	0
12-Jun	0	2245	1	4	0
13-Jun	2	2586	4	2	0
14-Jun	0	0	0	0	0
15-Jun	0	3301	2	1	0
16-Jun	1	1208	0	1	0
17-Jun	0	1442	0	0	0
18-Jun	0	1079	1	0	0
19-Jun	0	1019	0	0	0
20-Jun	0	1105	0	0	0
21-Jun	0	487	0	0	2
22-Jun	0	907	1	0	0
23-Jun	0	706	6	0	0
24-Jun	1	423	1	0	1
25-Jun	1	33	0	0	1
26-Jun	0	409	0	0	0
27-Jun	0	173	0	0	0
28-Jun	0	36	0	0	0
29-Jun	0	88	0	0	0
30-Jun	0	2	0	0	0
1-Jul	0	0	0	0	0
2-Jul	0	0	0	0	0
3-Jul	1	2	0	0	0
4-Jul	0	0	0	0	0
5-Jul	0	104	0	0	0
6-Jul	0	426	0	0	0
7-Jul	0	305	0	0	1

Table 13. Historic Fish Passage at Essex Dam, Lawrence, MA

Year	Atlantic Salmon[1]	American Shad	River Herring[2]	Striped Bass	Sea Lamprey	Gizzard Shad
1982	16	0	0	0	0	
1983	88	5,500	4,800	50	2,800	
1984	104	5,500	1,800	40	2,000	
1985	212	13,000	23,000	110	18,000	
1986	98	18,000	16,000	64	13,000	
1987	129 (6) *	17,000	77,000	133	18,000	
1988	65	12,000	360,000	86	8,900	
1989	85	7,900	379,000	262	12,000	
1990	243	6,000	250,000	377	8,300	
1991	331	16,000	380,000	632	10,000	
1992	197	21,000	102,000	424	18,000	
1993	61	8,600	14,000	169	11,000	
1994	17 (4) **	4,300	89,000	426	5,000	
1995	34	14,000	33,000	1,800	4,000	23
1996	69	11,000	51	584	3,600	224
1997	67	22,000	362	2,200	8,600	6
1998	123	28,000	1,400	1,400	4,000	180
1999	191	57,000	7,900	843	9,700	58
2000	85	69,000	19,000	1,100	11,000	208
2001	84	75,000	1,600	511	3,700	3,100
2002	56	55,000	526	1,900	8,100	57
2003	120	53,000	11,000	979	2,200	158
2004	131	45,000	15,000	806	6,700	50
2005	31	6,500	98	257	848	17
2006	49	1,200	1,100	0	111	1
2007	71	16,000	1,200	56	1,400	0
2008	123	25,000	108	42	4,900	1
2009	78	23,000	1,500	46	2,000	12
2010	85	10,500	518	61	3,400	0
2011	402	14,000	740	0	2,600	0
2012	137	21,000	9,000	0	2,000	0
2013	22	37,000	17,000	0	584	11
2014	41	35,000	34,000	144	5,000	29

1. Captured and transported to Nashua National Fish Hatchery for broodstock.
2. River herring is an undetermined mix of both alewife and blueback herring.

* In addition to the 129 salmon captured, 6 salmon escaped the fish trap.

** In addition to the 17 salmon captured, 2 salmon escaped and 2 were illegally taken by angling.

Table 14. Fish passage at the Pawtucket Dam Fishlift, Lowell, MA in 2015.

Date	Herring River	Shad American	Lamprey Sea	Salmon Atlantic	Shad Gizzard	<6" Lift eel	6"-12" Lift eel	>12" Lift eel	<6" Ramp eel	6"-12" Ramp eel	>12" Ramp eel
9-May	200	0	0	0	0	0	0	0	0	0	0
10-May	203	0	0	0	0	0	0	0	0	0	0
11-May	1555	4	0	0	0	0	0	0	0	0	0
12-May	1330	3	1	0	0	0	0	0	0	0	0
13-May	650	23	3	0	0	0	0	0	0	0	0
14-May	775	11	4	0	0	0	0	0	0	0	0
15-May	2180	13	1	0	0	0	0	0	0	0	0
16-May	520	3	1	1	0	0	0	0	0	0	0
17-May	430	6	4	0	0	0	0	0	0	0	0
18-May	3440	16	11	1	0	0	1	0	0	0	0
19-May	4450	357	3	0	0	0	0	0	0	0	0
20-May	4175	168	6	0	0	0	0	0	0	0	0
21-May	1420	438	19	3	0	0	0	0	0	0	0
22-May	1262	310	6	2	0	0	0	0	0	0	0
23-May	179	234	8	0	0	0	0	0	0	0	0
24-May	1632	3275	4	0	0	0	1	0	0	0	0
25-May	230	3550	0	0	0	0	0	0	0	0	0
26-May	88	2290	20	0	0	0	0	0	0	0	0
27-May	827	2190	23	0	0	0	0	0	0	0	0
28-May	2355	1925	0	0	0	0	0	0	0	0	0
29-May	1088	194	11	0	0	0	0	0	0	0	0
30-May	2360	1340	13	1	0	0	0	0	0	0	0
31-May	79	219	26	0	0	0	0	0	0	0	0
1-Jun	214	87	13	0	0	0	0	0	0	0	0
2-Jun	26	311	4	0	0	0	0	0	0	0	0
3-Jun	0	76	4	0	0	0	0	0	0	0	0
4-Jun	0	158	1	1	0	0	0	0	0	0	0
5-Jun	0	53	4	2	0	0	0	0	0	0	0
6-Jun	0	56	1	0	0	0	0	0	0	0	0
7-Jun	0	27	4	0	0	0	0	0	0	0	0
8-Jun	1	0	1	0	0	0	0	0	0	0	0
9-Jun	0	0	1	0	0	0	0	0	0	0	0
10-Jun	0	0	0	0	0	0	0	0	0	0	0
11-Jun	0	0	0	0	0	0	0	0	0	0	0
12-Jun	0	0	0	0	0	0	0	0	0	0	0
13-Jun	0	0	0	0	0	0	0	0	0	0	0
14-Jun	7	1055	0	1	0	0	0	0	0	0	0
15-Jun	0	360	0	0	0	0	0	0	0	0	0
16-Jun	0	532	0	0	0	0	0	0	0	0	0
17-Jun	0	230	0	0	0	0	0	0	0	0	0
18-Jun	0	197	1	0	0	0	0	0	0	0	0
19-Jun	0	1	0	0	0	0	0	0	0	0	0
20-Jun	0	0	0	0	0	0	0	0	0	0	0
21-Jun	0	0	0	0	0	0	0	0	0	0	0
22-Jun	0	0	0	0	0	0	0	0	0	0	0
23-Jun	0	0	0	0	0	0	0	0	0	0	0
24-Jun	0	120	0	0	0	0	0	0	0	0	0
25-Jun	0	8	0	0	0	0	0	0	0	0	0
26-Jun	0	250	4	2	0	0	0	0	0	0	0
27-Jun	0	89	1	0	0	0	0	0	0	0	0
28-Jun	0	79	0	0	0	0	1	0	0	0	0
29-Jun	0	68	1	0	0	0	0	0	0	0	0
30-Jun	0	6	0	0	0	0	0	1	0	0	0

1-Jul	0	40	0	0	0	0	0	0	0	0	0
2-Jul	0	13	0	2	0	0	0	0	0	0	0
3-Jul	0	0	0	0	0	0	0	0	0	0	0
4-Jul	10	0	0	0	0	0	0	0	0	0	0
5-Jul	0	0	0	0	0	0	0	0	0	0	0
6-Jul	0	35	0	0	0	0	0	0	0	0	0
7-Jul	0	31	0	0	0	0	0	0	0	0	0
8-Jul	0	145	0	0	0	0	0	0	0	0	0
9-Jul	0	2	0	0	0	0	0	0	0	0	0
10-Jul	0	41	1	0	0	0	0	0	0	0	0
11-Jul	0	46	3	0	0	0	0	0	0	0	0
12-Jul	0	14	0	0	0	0	0	0	0	0	0
13-Jul	0	78	0	0	0	0	1	0	10	0	0
14-Jul	0	84	0	0	0	0	0	0	20	0	0
15-Jul	0	52	0	0	0	0	0	0	20	0	0
16-Jul	0	19	0	0	0	0	0	0	20	0	0
17-Jul	0	5	0	0	0	0	0	0	10	0	0
18-Jul	0	0	0	0	0	0	0	0	150	0	0
19-Jul	0	0	0	0	0	0	0	0	300	0	0
20-Jul	0	0	0	0	0	0	0	0	10	0	0
21-Jul	0	0	0	0	0	0	0	0	50	0	0
22-Jul	0	0	0	0	0	0	0	0	12	0	0
23-Jul	0	0	0	0	0	0	0	0	75	0	0
24-Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A
25-Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	400	10	0
26-Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	0	0
27-Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	0	0
28-Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12		
29-Jul	0	0	0	0	0	0	0	0	88		
30-Jul									91		
31-Jul									37		
1-Aug									55		
2-Aug									53		
3-Aug	0	0	0	0	0	0	0	0	25	6	0
4-Aug	0	0	0	0	0	0	0	0	80	10	0
5-Aug	0	0	0	0	0	0	0	0	20	0	0
6-Aug	0	0	0	0	0	0	0	0	25	0	0
7-Aug	0	0	0	0	0	0	0	0	5	0	0
8-Aug	0	0	0	0	0	0	0	0	3	1	0
9-Aug	0	0	0	0	0	0	0	0	2	0	0
10-Aug	0	0	0	0	0	0	0	0	25	0	0
11-Aug	0	0	0	0	0	0	0	0	28	0	0
12-Aug	0	0	0	0	0	0	0	0	29	0	0
13-Aug	0	0	0	0	0	0	0	0	5	0	0
14-Aug	0	0	0	0	0	0	0	0	8	0	0
15-Aug	0	0	0	0	0	0	0	0	3	4	1
16-Aug	0	0	0	0	0	0	0	0	15	10	1
17-Aug	0	0	0	0	0	6	0	0	2	37	0
18-Aug	0	0	0	0	0	0	0	0	30	15	0
19-Aug	0	0	0	0	0	0	0	0	60	20	0
20-Aug	0	0	0	0	0	0	0	0	40	20	0
21-Aug	0	0	0	0	0	0	0	0	50	10	0
22-Aug	0	0	0	0	0	0	0	0	23	3	0
23-Aug	0	0	0	0	0	0	0	0	30	2	0
24-Aug	0	0	0	0	0	0	0	0	30	10	0

25-Aug	0	0	0	0	0	0	0	0	40	10	0
26-Aug	0	0	0	0	0	0	0	0	25	0	0
27-Aug	0	0	0	0	0	0	0	0	20	0	0
28-Aug	0	0	0	0	0	0	0	0	18	0	0
29-Aug	0	0	0	0	0	0	0	0	0	12	0
30-Aug	0	0	0	0	0	0	0	0	3	10	0
31-Aug	0	0	0	0	0	0	0	0	10	2	0
1-Sep	0	0	0	0	0	0	0	0	10	0	0
2-Sep	0	0	0	0	0	0	0	0	15	0	0
3-Sep	0	0	0	0	0	0	0	0	8	2	0
4-Sep	0	0	0	0	0	0	0	0	6	2	0
5-Sep	0	0	0	0	0	0	0	0	10	0	0
6-Sep	0	0	0	0	0	0	0	0	10	5	0
7-Sep	0	0	0	0	0	0	0	0	9	2	0
8-Sep	0	0	0	0	0	0	0	0	20	5	0
9-Sep	0	0	0	0	0	0	0	0	28	2	0
10-Sep	0	0	0	0	0	0	0	0	18	2	0
11-Sep	0	0	0	0	0	0	0	0	12	3	0
12-Sep	0	0	0	0	0	0	0	0	14	0	0
13-Sep	0	0	0	0	0	0	0	0	10	0	0
14-Sep	0	0	0	0	0	0	0	0	35	5	0
15-Sep	0	0	0	0	0	0	0	0	4	0	0
16-Sep	0	0	0	0	0	0	0	0	5	0	0
17-Sep	0	0	0	0	0	0	0	0	2	0	0
18-Sep	0	0	0	0	0	0	0	0	0	0	0
19-Sep	0	0	0	0	0	0	0	0	0	0	0
20-Sep	0	0	0	0	0	0	0	0	6	0	0
21-Sep	0	0	0	0	0	0	0	0	0	0	0
22-Sep	0	0	0	0	0	0	0	0	10	2	0
23-Sep	0	0	0	0	0	0	0	0	12	0	0
24-Sep											
25-Sep	0	0	0	0	0	0	0	0	0	0	0
26-Sep	0	0	0	0	0	0	0	0	0	0	0
27-Sep	0	0	0	0	0	0	0	0	0	0	0
28-Sep	0	0	0	0	0	0	0	0	0	0	0
29-Sep	0	0	0	0	0	0	0	0	0	0	0
30-Sep	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**31,686**	**20,937**	**208**	**16**	**0**	**6**	**4**	**1**	**2,412**	**222**	**2**
	Herring River	Shad American	Lamprey Sea	Salmon Atlantic	Shad Gizzard	<6" Lift eel	6"-12" Lift eel	>12" Lift eel	<6" Ramp eel	6"-12" Ramp eel	>12" Ramp eel

Table 15. Historic fish passage at the Pawtucket fishway and ladder, Lowell, MA.

(0-999 fish are reported to the nearest individual: 1,000-9,999 to the nearest 100: 10,000-99,999 to the nearest 1,000: 100,000 or greater to the nearest 10,000).

Year	American shad	River herring	Sea lamprey	Striped bass
1986*	1,600	570	910	0
1987	3,900	31,000	1,900	2
1988	1,300	32,000		
1989	922	37,000	1,900	1
1990**	443	9,900	169	4
1991				
1992***	6,600	34,000	200	0
1993	1,700	4,300	1,500	0
1994****	383	34,000	340	0
1995	5,300	12,000	920	18
1996*****	1,300	292	395	4
1997	4,400	20	2,000	26
1998	4,200	13	545	5
1999	16,000	2,900	3,700	17
2000	13,000	673	2,300	66
2001	7,700	58	606	16
2002	5,300	0	2,000	32
2003	6,600	194	822	51
2004	11,000	7,500	2,200	129
2005	716	201	185	7
2006	0	27	9	0
2007	1,700	0	127	2
2008	4,200			
2009	2,800	139	260	2
2010	479	43	507	
2011	1,200	256	272	5
2012	1,800	1,800	166	1
2013	13,500	9,800	70	3

* Testing period- Facility not fully functional.

** Lifts began 5/5, however counts did not begin until 5/30.

*** Fishlift out of operation 6/2 - 6/18.

**** Expanded estimate of fish ascending the fish ladder at Pawtucket Falls.

***** River herring counts include fish stocked by USFWS.

Table 16. 2016 Estimated Smolt Production

2016 ESTIMATED SMOLT PRODUCTION	2015 Est. Pre-Smolt	Units Sampled	Pre-Smolt Per Unit	Spring Smolt/Unit	Est. Smolt/Unit	Units Stocked	Est. 2016 Smolts
Westfield R							
Lower Basin (below Knightville):							
Dickinson Brook	15	5.5	2.7	1.6		499	817
Munn Brook	1	6.4	0.2	0.1		568	53
Stage Brook	2	12.2	0.2	0.1		339	33
Potash Brook	0	4.3	-	-		339	-
Sub-Total		**28.4**				**1745**	**903**
Middle Branch	1	7.5	0.1	0.1		1594	128
Kinne Brook	1	6.7	0.1	0.1		193	17
Sub-Total		**14.2**				**1787**	**145**
West Branch:							
West Branch- 8-16		0			0.01	3382	34
Yokum Brook		6.4	-	-		403	-
Factory Brook	0	9	-	-		397	-
Depot brook	6	6.5	0.9	0.6		290	161
Shaker Mill Brook		6.9	-	-		194	-
Walker Brook	6	9.7	0.6	0.4		407	151
Roaring Brook (WB)	8	6.8	1.2	0.7		108	76
Sub-Total		**45.3**				**5181**	**422**
East Branch:							
Nort h Branch Swift River	2	9	0.2	0.1		179	24
Swift River	0	10.4	-	-		179	-
Westfield Brook	0	7	-	-		436	-
Stones Brook	1	7.5	0.1	0.1		75	6
East Branch 2-6.5	2	42.4	0.05	0.03		846	24
East Branch 6.6- beach					0.01	3207	32
Mill Brook	2	11.8	0.2	0.1		431	44
Bronson Brook	0	7.7	-	-		444	-
Kearney Brook	4	5.7	0.7	0.4		115	48
Little River(upper basin)	0	15.3	-	-		341	-
Roaring Brook	1	4	0.3	0.2		116	17
Pond Brook	0	4.7	-	-		87	-
Tower Brook	0	5.8	-	-			
Sub-Total		**131.3**				**6456**	**196**

Deerfield River:

Bear River	1	5.9	0.2	0.1		394	40
Cold	0	8.1					
Chickley River	0	31					
Green River, MA	1	21.8	0.05	0.03		1883	52
Hinsdale Brook	0	5					
Mill Brook - Chickley	0	10.5	-	-		160	-
Mill Brook - Charlemont	2	5.2	0.4	0.2		227	52
Maxwell Brook - Charlemont	3	4.5	0.7	0.4		99	40
North River, East Branch	1	12.7	0.1	0.05		1859	88
North River, Mainstem					0	666	-
South River	0	13.6	-	-		231	-
North River- West Branch Brook	0	4.7	-	-		436	-
North River- West Branch	0	8.7	-	-		965	-
Pelham Brook	1	6.6	0.2	0.1		458	42
Poland Brook	0	6.9	-	-		160	-
Sanders Brook	0	6.2	-	-		60	-
Sub-Total		**151**				**7,598**	**313**

Mill River (Williamsburg):

East Branch	4	5.8	0.7	0.4		374	155
West Branch	0	7.1	-	-		497	-
Mill River	0	11.9	-	-		135	-
Sub-Total		**25**				**1,006**	**155**

Fall River

Fall River	0	21.8					
Fall River-Shattuck Brook	-	6				331	-
Sub-Total		**6**				**331**	**-**

Manhan River

Manhan River-Sodom Brook	1	5.6	0.2	0.1		198	21
Manhan River-North Branch	8	14.1	0.6	0.3		809	275
Sub-Total		**20**				**1,007**	**297**

Sawmill River

Sawmill River-upper					0.1	360	36
Sawmill River-middle	1	7.5	0.1	0.1		360	29
Sawmill River-lower	8	11.1	0.7	0.4		365	158
Sub-Total		**19**				**1,085**	**223**

Mill Brook	15	4.35	3.4	2.1		258	534
Sub-Total		4				258	534
		Units Sampled				Units Stocked	Est. Smolts Produced
2015 Totals	98	316.9				28,970	3,186

Fisheries Staff

Westborough Field Headquarters Staff

Todd A. Richards, Assistant Director, Fisheries
Richard Hartley, Environmental Review and Sportfish Awards Project Leader
Adam Kautza, Ph.D., Coldwater Fishery Resource Project Leader
Rebecca Quiñones, Ph.D., Stream and River Project Leader
Ken Simmons, Ph.D., Chief Fish Culturist
Caleb Slater, Ph.D., Anadromous Fish Project Leader
Jason Stolarski, Ph.D., Watershed Project Leader
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Heather Sadler, Wildlife Technician

Wildlife

John O'Leary (Partial Year) Laura Conlee (Partial Year)
Assistant Directors, Wildlife Research

Overview

The Wildlife Section is responsible for the conservation, management, and research of wildlife and game populations within the Commonwealth of Massachusetts; habitat management to maintain and enhance biodiversity on state Wildlife Management Areas (WMA); responding to human-wildlife conflicts; guiding and supporting the agency's Large Animal Response Team (LART); and supporting wildlife-dependent recreational opportunities.Toward these ends, 17 professional biologists in the Section, including foresters, ornithologists, ecologists, and technicians, implement wildlife habitat management and the deer, moose, furbearer, upland game, black bear, wild turkey, waterfowl, and bird conservation programs; study population ecology; license and inspect commercial game preserves; test and license Problem Animal Control (PAC) Agents, wildlife rehabilitators, and falconers; inspect commercial deer farms and other wildlife propagators' facilities; issue and process antlerless deer, turkey, and black bear permits; and administer a statewide pheasant-stocking program. The Wildlife Section develops science-based regulatory, policy, and programmatic recommendations for the Fisheries and Wildlife Board; provides technical assistance on habitat assessments for proposed management on DCR and other public and private forestlands; serves as the wildlife representative on the agency's land acquisition committee; directs and coordinates with the University of Massachusetts and the USGS Cooperative Fish and Wildlife Research Unit on scientific wildlife research projects within the Commonwealth of Massachusetts; represents the agency on wildlife conservation and management issues in public forums and in partnership with local, state, federal, and private organizations and entities; and serves as the state representative on the Northeast Association of Fish and Wildlife Agencies' various technical committees, as well as for the Northeast Association of Wildlife Administrators.

Assistant Director of Wildlife, John O'Leary retired December 11, 2015. After posting this position and several interviews, Laura Conlee, Furbearer Biologist, was officially promoted as Assistant Director of Wildlife on February 21, 2016. Private Lands Habitat Management Marianne Piche was transferred to the Wildlife Section in this year. See Private Lands Report following the Wildlife Section Report.

Habitat Management Programs

Landscape Analysis Projects
Jonathan Brooks, Wildlife Population Ecologist

Phase II in the development of a web-based tool that helps communities and agencies identify and reduce climate change impacts to natural resources and man-made infrastructure is ongoing. This project provides local decision-makers with: (a) access to the most current understanding of how climate change is likely to impact the important natural resources they value and the man-made infrastructure they depend on; (b) the means to view and understand the vulnerability of these resources to climate change; and (c) a menu of clear adaptation actions which can be implemented at the local level to address these vulnerability factors, making their communities more resilient to climate change impacts.

Discharge setbacks are areas where hunting is prohibited either by statute or by regulation. The Wildlife Population Ecologist continues to fine-tune the GIS-based maps representing setback areas and calculated that 60% – roughly 3.1 million acres – of Massachusetts is within a discharge setback.

The Wildlife Population Ecologist is modeling fire behavior for prescribed burn plans and fire management plans. GIS data layers are converted into formats that can be utilized in various fire modeling programs used for larger landscape planning.

Regional Conservation Opportunity Areas (RCOAs) are spatially delineated places within the Northeast Region where actions to support or enhance populations of Regional Species of Greatest Conservation Need (RSGCN) and/or their habitats are likely to be most effective. RCOAs can be used by the states and conservation partners to inform and guide land protection or habitat restoration actions for the benefit of RSGCN and their habitats. The Wildlife Population Ecologist represents the interests of Massachusetts in this regional project.

There are discrepancies in the regulations describing the Wildlife Management Zones. These have been identified and the Wildlife Population Ecologist will present recommended changes to the Fisheries and Wildlife Board.

Habitat Program (John Scanlon, Habitat Program Supervisor)

The Habitat Program is a component of the MassWildlfie Biodiversity Initiative, which in part seeks to maintain and restore the native diversity of birds and mammals through active land management. The Habitat Program facilitates applied management across a range of upland and wetland sites on both public and private lands to conserve birds, mammals, and other wildlife identified as species of conservation concern in the Massachusetts State Wildlife Action Plan (SWAP). Upland sites include grasslands, shrublands, and forestlands. Wetland sites include marshlands, shrub swamps, and forested swamps. Applied management practices include invasive plant control, mowing, prescribed burning, and tree clearing.

Habitat Program staff contract and administer these practices across >180,000 acres of Wildlife Management Areas (WMAs), and provide technical assistance to other public and private landowners interested in applied management to conserve wildlife. In addition, the Habitat Program assists the MassWildlife Realty Program and District offices with monitoring of >150 Wildlife Conservation Easements (WCE's) on >40,000 acres of private lands, land acquisition, and providing technical assistance to private and other public landowners interested in enhancing wildlife habitat for native birds and mammals through forest harvesting operations. The Habitat Program also assists with reviewing applications and awarding funding to projects under the MassWildlife Habitat Management Grant Program.
The Habitat Program's objectives are to:

1) Provide a spatial and temporal distribution of habitats for birds, mammals, and other species of conservation concern (including but not limited to grassland, marshland, shrubland, young forest, and late-seral stage forest habitats) on WMA, and WCE lands throughout Massachusetts.
2) Provide technical assistance to other public and private landowners and conservation organizations on management of grassland, marshland, shrubland, and young forest habitats. Conservation organizations include, but are not limited to, the U.S. Army Corp of Engineers (USACE), the Massachusetts Department of Conservation and Recreation (DCR) state forest and state watershed lands, town conservation lands, and private conservation lands (e.g., land trusts).

To achieve the first objective, the Habitat Program follows landscape composition goals for WMAs approved by the Massachusetts Fisheries & Wildlife Board that include 20-25% early-successional habitat (including 1-2% grassland, 8-9% shrubland, and 11-14% young forest habitat ≤30 years old), 65-75% mid-successional forest habitat between 30-150 years old, and 10-15% biologically mature forest habitat ≥150 years old. Habitat Program staff conduct commercial forest harvesting operations through a public, competitive bidding process in compliance with all local, state, and federal permitting requirements.
To accomplish the second objective, Habitat Program staff conduct technical reviews and site visits of proposed management activities on USACE, DCR, town, and private conservation lands.

Project Accomplishments

Administration

Habitat Program staff evaluated and prioritized field sites for active and passive habitat management activities, and selected Nine WMA's for active management in FY2016 to help achieve landscape composition goals for a spatial and temporal diversity of successional stages at the landscape level (Table 1). Staff assisted with preparation and/or updating of site plans for these WMA's, created and administered habitat management contracts with private vendors at these sites and planned or contracted biological monitoring at these sites. Habitat Program staff also maintained GIS databases of management and monitoring information for these sites.

Biological Monitoring

Regular monitoring is essential for practicing adaptive natural resource management and typically includes one or more of the following: 1) vegetation sampling to determine the relative abundance of all vascular plants in the forest understory and overstory and to determine regeneration success of desired tree species on harvested sites; 2) identification and location of invasive plants for subsequent control efforts; 3) identification and location of rare plants in order to design appropriate mitigation during harvesting activities; 4) photo documentation of pre- and post-harvest conditions; and/or 5) wildlife sampling to determine habitat use (e.g., breeding bird surveys, butterfly/moth surveys).
During FY2016, Habitat Program staff conducted pre-treatment monitoring of herbaceous vegetation including ferns, and broadleaved non-woody plants on previously unmanaged portions of the Montague Plains and Frances Crane WMAs. Post-treatment vegetation monitoring occurred on managed portions Frances Crane WMA, and Montague Plains WMA. Breeding bird surveys were conducted at the Camp cachalot WCE, Southeast Pine Barrens WMA, Quashnet Woods WMA, Mashpee Pine Barrens WMA, Martin Burns WMA, Bolton Flats WMA, and Birch Hill WMA.
Habitat Management Practices.

A total of 1,408 acres were treated with one or more management practices by Habitat Program staff in FY2016 (Table 1). Specific practices for individual sites are described below.

Frances Crane WMA North
About 80% of the existing overstory canopy was cleared on 110 acres of second-growth mixed pine/oak forest to restore an open canopy pitch pine/oak woodland with a dense understory of scrub oak, blueberry, huckleberry and other native shrubs. Harvested trees primarily included poor quality white pine, pitch pine, black oak, red oak, white oak, and red maple. Retained canopy trees included well-formed pitch pine, white oak, red oak, and black oak. In addition, invasive plant control was conducted on 205 acres of existing grassland habitat.

Frances Crane WMA South
Grassland habitat enhancement occurred on 58 acres. Management practices included tree clearing from hedgerows in between existing fields of exotic cool season grasses, grading of hedgerows, harrowing of graded hedgerows and adjacent cool season grass fields, and planting of all acres to native warm season grasses.

Camp Cachalot WCE
About 80% of the existing overstory canopy was cleared on 80 acres of second-growth mixed pine/oak forest to restore an open canopy pitch pine/oak woodland with a dense understory of scrub oak, blueberry, huckleberry and other native shrubs. Harvested trees primarily included poor quality white pine, pitch pine, black oak, red oak, white oak, and red maple. Retained canopy trees included well-formed pitch pine, white oak, red oak, and black oak.

Cooks Pond WMA
Permitted dredging and erosion control measures occurred on 26 acres of this coastal plain pond.

Southeast Pine Barrens WMA
About 80% of the existing overstory canopy was cleared on 100 acres of second-growth mixed pine/oak forest to restore an open-canopy pitch pine/oak woodland with a dense understory of scrub oak, blueberry, huckleberry and other native shrubs. Harvested trees primarily included poor quality white pine, pitch pine, black oak, red oak,

Table 1. FY-2016 Habitat Program Sites

Site Name	Town	Habitat Type	Objective	Acres
Frances Crane WMA North	Falmouth	Pitch Pine/Scrub Oak Woodland	Restore	315
Frances Crane WMA South	Falmouth	Pitch Pine/Scrub Oak Woodland	Restore	58
Camp Cachalot WCE	Plymouth	Pitch Pine/Scrub Oak Woodland	Restore	92
Cooks Pond WMA	Plymouth	Coastal Plain Pond	Restore	26
Southeast Pine Barrens WMA	Carver	Pitch Pine/Scrub Oak Woodland	Restore	100
Burrage Pond WMA	Halifax	Freshwater Bog	Restore	10
Martin Burns WMA	Newbury	Shrubland	Maintain	35
Muddy Brook WMA	Hardwick	Pitch pine/Scrub oak Woodland	Restore	50
Raccoon Hill WMA	Barre	Freshwater Marsh	Restore	2
Montague Plains WMA	Montague	Pitch pine/Scrub oak Woodland	Restore	325
Leyden WMA	Leyden	Blueberry Barrens	Maintain	110
Southwick WMA	Southwick	Grassland	Restore	210
Fairfield Brook WMA	Richmond	Freshwater Marsh	Restore	7
Maple Hill WMA	West Stockbridge	Shrubland	Maintain	68
Total				**1,408**

white oak, and red maple. Retained canopy trees included well-formed pitch pine, white oak, red oak, and black oak.

Burrage Pond WMA
Pit & mound grading occurred on 10 acres of abandoned cranberry bog to restore natural water flow and topography.

Martin Burns WMA
Invasive plant control targeting invasive shrubs such as honeysuckle, autumn olive, and buckthorn occurred on 35 acres of existing shrubland habitat.

Upper Parker River WMA
Five acres of second-growth mixed white pine-oak forest was cleared, stumped, and extensively graded to expose sandy mineral soil to provide nesting habitat for state-listed Blanding's turtles.

Muddy Brook WMA
Invasive plant control targeting invasive shrubs such as honeysuckle, autumn olive, Japanese barberry, and buckthorn occurred on 50 acres of existing scrub oak shrubland habitat.

Raccoon Hill WMA
Painstaking invasive plant control of Phragmities occurred on 2 acres of freshwater wetlands.

Montague Plains WMA
About 60% of the tree canopy was cleared across 290 acres to favor an understory of lowbush blueberry and scrub oak, and to enhance growth of retained pitch pine and tree oaks in the open overstory. The tree clearing reduced woody fuel loads to the point where prescribed burning can be used in subsequent years to maintain this unique fire-adapted community that supports both rare and declining species. Mowing/mulching to reduce shrub layer fuels and to establish fuel breaks for future prescribed burning occurred on a total of 325 acres, including the 290 recently harvested acres, plus 35 previously harvested acres.

Leyden WMA
Invasive plant control targeting invasive shrubs such as honeysuckle, autumn olive, and buckthorn occurred on 110 acres of existing blueberry shrubland habitat.

Southwick WMA
Invasive Plant Control targeting invasive shrubs such as honeysuckle, autumn olive, and buckthorn occurred on 197 acres, follow-up mowing/mulching of standing dead invasive shrubs occurred 50 of those 197 acres, and tree clearing, stumping, harrowing, and native warm season grass seeding occurred on 13 acres additional acres (a total footprint area of 210 acres of habitat).

Fairfield Brook WMA
Painstaking invasive plant control of Phragmities occurred on 7 acres of freshwater wetlands.

Maple Hill WMA
Invasive plant control targeting invasive shrubs such as honeysuckle, autumn olive, and buckthorn occurred on 68 acres of abandoned field (shrubland) habitat.

Wildlife Conservation Easement and Fee Ownership Compliance Monitoring

Compliance monitoring for WCEs involves site visits to timber sales and other forest cutting operations on private lands where DFW owns development and public access rights. In FY2016, Habitat Program staff employed both the agency-wide Land Information Framework to track all WCE monitoring across the state and the outreach protocol to establish and maintain routine contact with WCE fee owners regarding their forest management responsibilities.
In FY2016, monitoring of Forest Management Plans and/or active Forest Cutting operations occurred at the Berkshire Natural Resources Council Alford Springs WCE in Alford, the Dalton Fire District WCE in Dalton, The Franklin Land Trust WCE in Heath, the Heyes-Tully Mountain WCE in Orange, WCE in Granby, the Hitchcock Mountain WCE in East Brookfield, the Hull Forestlands Goss Hill, Knightville, and Lily Pond WCE's in Chesterfield, the Metacomet land Trust WCE in Blackstone, the TNC High Rock WCE in Mount Washington, the Paul C. Jones Working Forest WCE in Shutesbury, and the W.D. Cowls Pike Lot WCE in Leverett.

Technical Assistance and Coordination

The Habitat Program provided technical assistance to DCR by reviewing seven proposed harvesting operations totaling 1,247 acres on state forest lands across Massachusetts including the Townsend State Forest Brookline Road lot (57 acres), Sandisfield State Forest Clam River Dam lot (124 acres), the H.O. Cook State Forest State Road lot (286 acres), October Mountain State Forest Heapy-Richardson lot (230 acres), and the Oakham State Forest Stonewall lot (550 acres).

Other public lands where the DFW Forestry Program provided technical assistance on using harvesting operations to enhance wildlife habitat in FY2016 included the U.S. Army Corp of Engineer Birch Hill Dam Elm Street lot (100 acres).
Lastly, Habitat Program staff provided technical assistance to Westfield State University Forest Resources class by conducting field trips for students to on-going harvests at the Montague Plains WMA in Montague.

Upland Game Program
Dave Scarpitti, Wild Turkey and Upland Game Biologist

Wild Turkey Harvest

During the 12-day fall wild turkey hunting season there were 77 male and 107 female (58.2%) wild turkeys harvested during the 2015 fall hunting season. The proportion of females harvested in 2015 was comparable to most years over the past decade (41.8-59.8%) and represents the 5th consecutive year where the female harvest was greater than the male harvest.

Archery hunters (including crossbow under special permit) continued to contribute a significant portion of the total harvest, accounting for approximately 27.7% of the total fall harvest; spring season archery hunters typically account for 4-5% of the total harvest. A large portion of this archery harvest can likely be attributed to archery deer hunters who are opportunistically harvesting turkeys. The high prevalence of archery harvest during the fall season, and the growth of fall only permits indicate continued growth in demand for fall turkey hunting opportunities.

Hunter participation, weather conditions, and food availability may all influence the fall turkey harvest. 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. However, archery deer season hunters appear to be opportunistically harvesting turkeys when the seasons overlap each fall. That said, overall fall hunter participation remains low relative to the number of total turkey permit holders.

In the 4-week spring wild turkey hunting season of 2016, a total of 2963 wild turkeys were harvested during the regular spring season, representing the second highest spring harvest total ever. An estimated 11.3% of permitted hunters were successful in harvesting at least one turkey during the spring hunting season. Approximately 2.6% of permitted spring turkey hunters harvested a season limit of 2 bearded wild turkeys. Actual hunter success rate is likely slightly higher than reported as a small proportion of hunters may obtain a permit but fail to hunt during the 4 week spring hunting season.

Bearded hens accounted for less than 1% of the total spring 2016 wild turkey harvest. Bearded hens have comprised <1% of the total spring wild turkey harvest over the past decade (Table 6). Over 2X more adults (69.3%) were harvested compared to immature males (30.3%). The ratio of adult males to immature males was 2.28, substantially high for the 5th consecutive year. It is likely that the high adult:immature ratio is due to hunter preference to harvest adult males.

In 2016, harvest was highest in Worcester (n = 769), Franklin (n = 469), and Berkshire (n = 345) counties. Suffolk County (4 towns) is nominally within the open zone but is heavily urbanized and many areas are closed to hunting and firearm discharge by local ordinances. Spring turkey hunting season is now open for 4 weeks statewide, except for Nantucket which lacks evidence of wild turkeys and is closed to spring turkey hunting. Generally, western counties are showing reduced spring harvest while eastern counties are showing increasing turkey harvest, however spring turkey harvest in 2016 was higher in every county compared to 2015 (except Dukes Co. where the reported harvest was 2 in 2015, and only 1 in 2016). Again, the distribution of hunter effort may be greatly influencing this trend, however it is also quite possible that as habitat in western portions of the state are less productive and turkey abundance is declining. A record proportion of spring turkey hunters (7.7%) harvested turkeys with archery equipment in 2016; archery hunting for wild turkeys and other big game continues to increase in popularity particularly in areas of eastern Massachusetts where many town lands and other properties will only allow the use of archery.

Winter conditions were mild in 2015-2016, and acorn abundance was above average in most areas in the fall of 2015. These factors in addition to a good brood production year in 2015 all likely contributed to the increase in fall 2015 harvest as well as the near record harvest in the spring of 2016. Overall, hunting opportunities remain excellent across the state, as the relatively high turkey population statewide continues to offer quality hunting experiences.

The 8th annual mentored youth wild turkey hunt was held on 23 April 2016, the Saturday immediately preceding the opening date of the spring hunting season. In order to participate, youths (ages 12-17) were required to complete a standardized training program and field exercise (pre-hunt workshop) conducted by participating sportsmen clubs and National Wild Turkey Federation chapters. Youths aged 12-14 were given a special 1-day turkey tag. Youths 15-17 are required to be licensed and obtain a regular turkey permit to be eligible for the mentored youth hunt day. An estimated 266 youths participated on the youth turkey hunt day (271 youth permits issued). Youths harvested a total of 91 turkeys (39 immature, 52 adult) on youth day, representing a success rate of approximately 34%. Youth success rates are typically 3 times greater than regular spring season hunter success.

Ruffed Grouse

In 2016, ruffed grouse drumming survey routes were surveyed between 15 April – 5 May. Overall, the average number of drums (ANDS) heard per stop per route on all random

routes statewide in 2016 was 0.08, lower than previous years 2007-2015 (0.20-0.34). The ANDS per route in the Western District in 2016 (0.16) was approximately 50% lower in (0.31) than in 2015. ANDS was roughly similar in the Connecticut Valley district in 2016 (0.13) compared to the past 2 years (0.14-0.16). ANDS was also similar in the Central District (0.05) in 2016 compared to 2014-2015 (0.03-0.15). No randomly located drumming routes were actively surveyed in the Northeast District or Southeast District, all routes were considered "constant zero".

The ANDS per route for subjective routes completed statewide in 2016 was 0.33, slightly below recent years, though markedly higher than the very low ANDS recorded in 2013 (0.16).

Overall, grouse breeding activity as indexed by the drumming survey was lower in 2016 compared to recent years. This is largely attributed to lower ANDS on Western District routes. Grouse were heard on those routes, just in lower numbers than previous years which may indicate some natural variation in abundance, rather than drastic changes in distribution.

Grouse continue to be detected on a subjective route in the Southeast District (Route 41) and a new Subjective route in the Northeast District (Route 49, Ashby). Grouse are not widespread in these districts but can be locally abundant in areas with suitable habitat. Some specific survey routes continue to demonstrate very high counts (3-4X greater than the average) of drumming activity, an indication that where good quality habitat is available, very high grouse populations can be achieved. This further demonstrates the need for young forest and shrubland habitat management to support grouse and other species of conservation need that are dependent on various stages of early-successional habitat.

American Woodcock

Currently, there are 19 randomized singing-ground survey routes in Massachusetts. Of those 19, 8 were active in 2016. The average number of woodcock heard peenting per route (including constant zero routes) in 2016 was 1.83, slightly above the long term 10 year average of 1.63. On the 8 active routes, a total of 33 woodcock were heard peenting, or 4.13 per non-constant zero route.

The U.S. Fish and Wildlife Service computes a breeding index using only routes that have been repeatedly completed over the duration of the survey. The breeding index (number of singing males per route) in 2016 (1.07) was slightly below but similar to recent years. Regionally, woodcock populations have displayed a 0.93% annual decline since 1968, however the trend in breeding male abundance over the past 10 years has remained stable within the Eastern Management Region.

USFWS also estimates harvest for woodcock through the Harvest Information Program (HIP). A sharp increase in hunter numbers and number of woodcock bagged occurred in 2011 coinciding with a 50% season length expansion. However, the estimated number of hunters and harvest has been relatively stable from 2012-2015 at around 2000, similar to levels observed/estimated during previous years under a 30 day season framework.

Mourning Dove

Doves are not considered a game species in Massachusetts, but they are one of the most abundant and popular game bird species across the nation. After more than 40 years of participation, the U.S. Fish and Wildlife Service cancelled the annual Mourning Dove Call Count Survey, a standardized survey to provide regional population data for mourning doves. However, in June 2016, one dove survey was completed that involved utilizing the standard/historic call count route in central Massachusetts.

New England Cottontail

DNA analyses were conducted on 112 pellet samples collected on survey plots located in southern Berkshire County and portions of Upper Cape Cod. All plots were surveyed from early January through March 2016. Plots were surveyed 1-4 times, with most being surveyed 3 or 4 times (only 2 were surveyed only once). The 112 samples were identified as follows: 5 unidentified, 1 white-tailed deer, 79 eastern cottontail, and 28 New England cottontail. All new England cottontail were identified on plots from Cape Cod. Of the plots that were surveyed that contained rabbits, all had eastern cottontail. No snowshoe hare samples were collected.

Live trapping of rabbits occurred at two MassWildlife properties in Sandwich, Barnstable County; the Sandwich Fish Hatchery and the Sandwich Game Farm. Live trapping of rabbits occurred during the first 2 weeks of January. Eight rabbits were trapped and transported to the Roger Williams Park Zoo, 2 of which were returned (additional males not needed). Two females and 1 male from each property were retained by the zoo. Trapped rabbits from Massachusetts were successfully entered into the captive breeding programs at Roger Williams Park Zoo and the Queens Park Zoo. Several successful litters were produced from Massachusetts founding rabbits and have been utilized in translocations in Rhode Island (Great Swamp WMA and Patience Island) and in New Hampshire.

Waterfowl Program
H W Heusmann, Waterfowl Program Leader

Division personnel conducted nest-box checks on 51 of 52 study sites used to monitor wood duck populations statewide. One site could not be checked in the Connecticut Valley because of low water conditions.

The spring of 2015 was followed a harsh winter in the northeast with colder than normal temperatures and record snow falls. However, the moisture content of the snow was low and water conditions remained low. Nesting was delayed again this year.

Wood duck nesting attempts declined with only 256 nest starts compared to 297 last year and 321 in 2013. There were 191 hatches compared to 237 last year. Hooded mergansers, a species that has increased substantially in the past two decades also declined slightly to 131 starts compared to from 138 nest starts last year but there were 110 hatches compared to 109 last year. Overall box use was 70% compared to 76% last year. Due to other commitments, particularly the winter black duck banding program, and man-power shortages, most non-study sites in the Northeast and Southeast districts could not be serviced. Massachusetts participates in the Atlantic Flyway Resident-goose Banding Program. The Atlantic Canada Goose Resident Population Management Plan only requires Massachusetts to band 550 geese but we band 800+ for the federal database. Geese are captured by roundups during the summer molt. A total of 792 Canada Geese were banded at 75 sites in 67 cities and towns in Massachusetts. The state total included 429 goslings and 363 adults. Crews also captured an additional 181 previously banded geese.

The 2015 airboating season was again marked by near drought conditions which hampered banding. Moon phases also compromised the program as the full moon the end of September curtailed the season during what is normally the most productive period. We ended up boating on 14 nights and banded 760 birds. Among birds banded, there were 634 Wood Ducks, 92 Mallards, 1 American Black Ducks, 11 Green-winged Teal, 9 Blue-winged Teal, and 8 Sora, 3 common moorhens and 1 American coot. . Thirty-seven previously banded birds were also recaptured. Airboat bandings were augmented by capturing 97 mallards at 6 sites where people feed them using bait traps and drop nets. Such ducks are an integral part of mallard ecology in the Northeast.
During the period of September 8-25, Massachusetts conducted a state-wide resident Canada Goose hunting season, with a daily bag of seven. The U.S. Fish and Wildlife Service (USFWS) Harvest Information Program (HIP) report is delayed in harvest estimates for the current year. However, the USFWS estimated a September season harvest of 2,700 in 2014. This compares to 2,100 in 2013, 1,600 geese harvested in 2012, 2,200 geese in 2011, 2,200 in 2010, 4,200 in 2009; 4,600 in 2008; and 2,600 the previous year.

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 70 days with a three-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 50 days with a three-bird bag limit in the Berkshire zone for Atlantic Population (AP) geese.

There was no Midwinter Waterfowl Survey conducted in 2015-16 due to federal budget cut-backs. A reduced survey covered only major Atlantic brant and snow goose concentration which did not include Massachusetts.

During the period January 16—February 6, 2016, Massachusetts held a late, resident Canada Goose season in the Central Zone and one in the North Coastal Zone January 23-February 13 with a five-bird daily bag in each zone. Unlike last year, the winter was relatively mild with scant snow fall. The USFWS is delayed in harvest estimates for the current year. However, the USFWS estimated a harvest of 1,300 in 2015 compared to 1,500 in 2014, 4,500 in 2012, 2,800 in 2011; 2,900 in 2010; 1,200 geese in 2009; 2,300 geese in 2008; and 3,100 birds in 2007.

Postseason banding of wintering Black Ducks continued as part of an experiment to determine if two-season Black Duck banding efforts can improve the precision for Black Duck survival rates. Continued banding was requested while analysis of the first 5 years of banding was evaluated. All Mallards and Mallard x Black Duck hybrids could be banded and broken down into five plumage types. Bait-trapping was carried out at 20 coastal sites in 11 towns from the New Hampshire to the Rhode Island borders. Trapping was carried out in January and February 2016. Unlike the severe winter of 2014-15 when trapping success was high but there was also winter mortality due to prolonged severe cold, the winter of 2015-16 was mild and ducks were not stressed. Totals of 387 American Black Ducks, 39 black-plumaged hybrids, 2 intermediate types, 1 Mallard-plumaged hybrid, and 79 Mallards were banded. In addition, there were 67 previously banded birds including 7 birds by other banders. During April and May, we participated in the Northeastern states' waterfowl breeding survey, which is based on sampling randomly selected 1-kilometer-square plots. Massachusetts checked 91 of the 1,306 plots checked in this year's survey. The population estimate in the Northeastern states for Mallards was 260,793 pairs +15%, was up slightly over last year but part of a long term decline since 1995. The estimate for Black Ducks was 15,214 pairs +38%. Wood

Ducks, 210,335 pairs +17%; and Canada Geese, 354,215 pairs +16%. In general wood duck and Canada goose populations are increasing while mallard and black duck populations have declined. Data from this survey is used to set hunting season regulations tailored to the Atlantic Flyway.
As part of the study on the newly described Wellfleet Bay Virus, first detected off Cape Cod, 39 adult female and 13 adult male eiders were captured and banded in Boston Harbor during a one day trip to Calf and Outer Brewster Islands. Thirteen previously banded birds were recaptured. Most females were captured on nests while all the males were mist netted on the water. All birds were blood sampled in conjunction with ongoing virus testing by USDA-Wildlife Services.

Massachusetts entered its 18th year of the federal Harvest Information Program (HIP). Beginning in 2012, all migratory bird hunters could register for HIP only via an online registration system. Hunters are no longer issued a HIP number but their license indicates they completed the HIP survey. Hunters had the convenience of registering from their home computer, at venues selling hunting licenses, or at any MassWildlife office. Waterfowl and woodcock hunters are automatically given a HIP survey each time they buy a waterfowl stamp with a new hunting license through the state's MassFishHunt system. In 2015 11,140 hunters had registered with Massachusetts HIP.

Massachusetts issues individual egg-addling permits for resident Canada Goose control under a federal program begun in March 2007. In 2015, we issued 44 such permits, all of which were returned. The permittees reported addling 1,096 eggs in 237 nests, while USDA/APHIS Wildlife Services addled 475 eggs in 101 nests under their statewide permit.
The waterfowl program leader attended the Atlantic Flyway Council technical and council meeting in Albany, New York in July, 2015 and then tele-conferenced in September and October at the next meetings as the U.S.F.W.S. is condensing the regulatory cycle from separate Early and Late Season regulations into a single cycle. The program leader then attended the Technical Section meeting of the Atlantic Flyway Council held in Virginia Beach in February 2016. He is a member on the Mallard, Black Duck, and Canada goose committees as well as voting representative for Massachusetts.

Bird Conservation Program
Andrew Vitz, State Ornithologist

American Kestrel Project

The DFW and partners continued the American Kestrel project that was initiated in 2013. The focus of the project is to promote breeding productivity by deploying nest boxes and tracking movements by banding nestlings. Collaborators on this project include the Massachusetts Audubon Society, Keeping Company with Kestrels, Kestrel Land Trust, MA Department of Transportation, MA Department of Conservation and Recreation, Essex County Ornithological Club, East Quabbin Land Trust, Grafton Land Trust, The 300 Committee, and a few dedicated individuals (Ron Rancatti, Ed Neumuth).

It was a good year for nesting kestrels in Massachusetts providing further evidence that the measures we are doing are successfully increasing the kestrel population in the state that prior to these efforts had been in steady decline for many years. In 2016, MassWildlife and partners monitored 171 kestrel nesting boxes in Massachusetts. Although we have not been able to obtain information on the 37 boxes monitored by Ron Rancatti, 44 of the remaining 134 boxes (33%) were occupied by nesting kestrels and all but 6 of these successfully produced fledglings (86%). Nest boxes in cranberry bogs in southeast Massachusetts had a 55% (18/33) occupancy rate (Joanne Mason – Keeping Company with Kestrels), in the Connecticut River Valley 9/35 (26%) of boxes were occupied, and in central Massachusetts (Worcester County) 13/40 (33%) monitored boxes were occupied in 2016. As in prior years, occupancy rates remained low in northeastern Massachusetts (2/18) but successful boxes were located at the Strawberry Hill reservation (Ipswich) and in the town of Dracut.

In addition to monitoring nesting success, we also banded chicks prior to fledging from boxes. During 2016, 138 nestlings were banded in the state with Masswildlife staff banding 66 chicks from 16 nest boxes. Recoveries of banded kestrels continue to provide information on the birds movements and three kestrels banded in Falmouth as nestlings were captured at the Carver landfill in August by kestrel researcher Joanne Mason. Overall, this was a particularly good year for nesting kestrels in Massachusetts, and we will continue to work with partners to maintain current boxes, install additional boxes in suitable nesting habitat, and monitor boxes and band young when possible.

Shrubland Bird/Tornado Project

Early-successional forests have become increasingly scarce in Massachusetts and account for less than 4% of the total forested habitat in the state. As a result of a reduction in habitat, many species associated with this habitat type are experiencing steep population declines. On June 1, 2011, a large tornado touched down and tore through a 40 mile stretch of south-central Massachusetts, from Westfield to Charlton. This had a dramatic impact on the region and converted nearly 5,000 acres of mature forest into young-forest habitat.

To learn about the avian response to natural disturbance the Massachusetts Division of Fisheries and Wildlife partnered with collaborators at the Massachusetts Department of Conservation and Recreation (DCR), the U.S. Forest Service, and The Nature Conservancy to conduct a project using automated audio-recorders to document bird use of these areas during the nesting period. Seventy-four locations were randomly selected and divided into the three treatment groups within three treatment groups (tornado-impacted areas, tornado-impacted areas that were salvage-logged, adjacent mature forest not directly impacted by the tornado). When possible, points were sampled on two days each year with each day consisting of 10-minute periods being recorded during 5 intervals around sunrise and sunset. Data was collected from 2012-2014.

Extracting data from recordings was time consuming, but this was completed for all years in early 2016. Preliminary results from the study reveal that almost all of the early successional forest species showing population declines were found in both groups of the tornado impact areas but not the adjacent mature forest. These species included 6 listed in our State Wildlife Action Plan (Prairie Warbler, Blue-winged Warbler, Chestnut-sided Warbler, Eastern Towhee, Brown Thrasher), with one being state-listed (Eastern Whip-poor-will). In addition to the expected use of this habitat by early successional breeding birds, many forest-breeding birds were documented using the young-forest habitat, presumably for food and cover.

In spring 2016 a University of Massachusetts graduate student (Lindsay Stevenson) and United States Fish and Wildlife Service employee took on the project for her master's thesis. Lindsay will be leading the effort to collect an additional year of data in summer 2017 and analyzing the data from all years of the project to examine the avian response during the years after the tornado.

Black Bear Program
Dave Wattles, Black Bear Program Leader

Black Bear Distribution and Harvest Investigations

A record total of 13,746 bear-hunting permits were issued for the 2015 hunting season. A total of 236 bears (240 in 2014) were taken during the 48-day season, including 130 during the 17-day September segment, 48 during the 18-day November segment, and 59 during the 12-day deer shotgun season segment. One hundred forty-two males, 91 females and 4 unknown were taken in Berkshire (n=75), Franklin (n=77), Hampden (n=30), Hampshire (n=38), Middlesex (n=1) and Worcester (n=16) counties. Sixty-six percent of bears were reported through the online system in 2015, compared to 74% in 2014 and 69% in 2013. Data from the 2015 Annual Hunter Survey have not been analyzed and will be presented in the 2016 Annual Report. There were 54 additional confirmed mortalities in CY 2015. These mortality records are collected by Massachusetts Division of Fisheries and Wildlife staff and through Environmental Police call logs and included: 48 road-kills; 1 bear taken under M.G.L. Ch. 131, Sec. 37, and 5 of unknown causes. MassWildlife received 111 bear calls and the Massachusetts Environmental Police received 276 bear calls.

A proposal to open bear hunting statewide and allow bear hunting during the shotgun deer season was approved by the Fisheries and Wildlife Board in 2014 and became effective for the 2015 bear season. Fifty-nine bears were harvested during the new deer shotgun season in 2015.

Black Bear Research

The Massachusetts Division of Fisheries and Wildlife 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 refine the population model for evaluating population trends of bears in Massachusetts; (2) to document black bear habitat use 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. Fourteen female bears were monitored with GPS collars in 2015. To date, 34 female bears have been monitored with GPS collars, of which most have been monitored for at least 2 reproductive seasons. MassWildlife monitored cub production/yearling survival at all successful winter dens or through encounters with sows/yearlings.

Furbearer Program
Dave Wattles, Furbearer Program Leader

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 1,774 furbearers were tagged at MassWildlife check stations during the 2015-16 season. The harvest (a combination of hunted, trapped, and/or salvaged) of tagged species included 727 beaver, 79 bobcat, 532 coyote, 280 fisher, 29 gray fox, 12 mink, 57 river otter, and 58 red fox. Trapper survey results indicated that a minimum of 71 raccoons, 518 muskrat, 21 skunks, 16 opossum, and no weasel were trapped during the 2015-16 season. Data from the 2015 Annual Hunter Survey have not been analyzed and will be presented in the 2016 Annual Report.

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 as a result 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 the DFW.

Licensed trappers tagged 727 trapped beaver during the 2015-16 trapping season, of which 63 were reported as taken under emergency permits. PAC Agents reported taking 603 beaver outside the trapping season (April 15, 2015 - October 31, 2015) under emergency permits and 89 beaver during the trapping season (during the trapping season November 1, 2015 to December 31, 2015), of which 67 were taken under emergency permit. Licensed trappers reported through the voluntary trapper survey that 220 beaver were taken under the local Board of Health 10-day Emergency Permit, which includes beaver taken outside the season (n=194) and only beaver taken during the season that were not sealed at a MassWildlife check station (n=26). In total, a minimum of 797 beaver were taken outside of the trapping season as nuisance animals. A minimum of 733 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 (David Stainbrook, Deer and Moose Program Leader)

Harvest and Population

The statewide 2015 harvest of 10,102 deer represents the seventeenth-highest harvest reported in Massachusetts since 1966 (Fig. 1). The 2015 total harvest was about 10% lower than the 2014 hunting season and 10% lower than the previous 5-year average. The lower harvest was attributed to unseasonably warm weather, lack of snow cover, and abundance of food during the season. The 2015 archery season harvest was for the first time ever higher than the shotgun season harvest (Fig. 1, Table 1).

Currently, the deer population statewide is estimated to be over 100,000 deer. Density estimates (from harvest data, so estimates only apply to lands that are hunted) range from 12-18 deer per square mile of forest in western and central Massachusetts to over 50 deer per square mile on the islands of Martha's Vineyard and Nantucket and some suburban Boston areas. Areas with little to no hunting access anywhere in the state can see deer numbers above our estimates. For example, a 2013 non-harvest-based deer survey on the Blue Hills Reservation (over 7000 acres closed to hunting) near Boston yielded estimates of over 85 deer per square mile of forest.

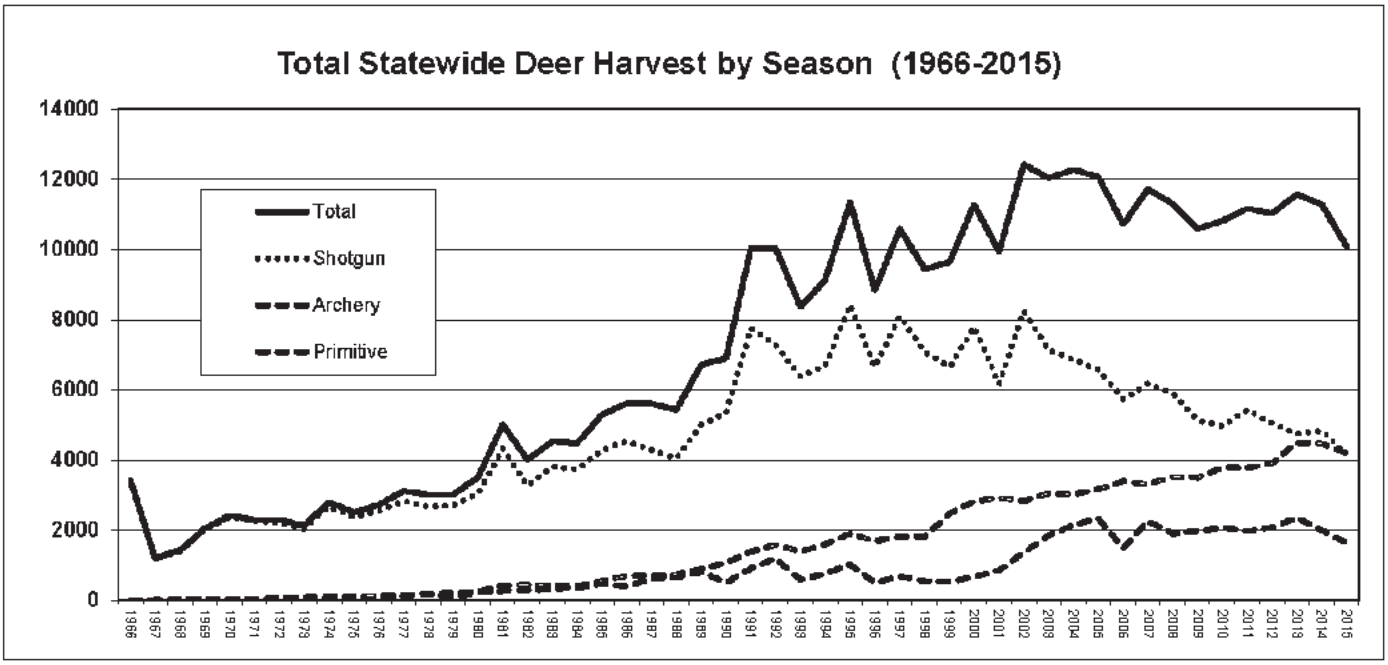


Figure 1. Total white-tailed deer harvest by season and year in Massachusetts.

Season	Adult Male	Female	Button Buck	Total	Percent Harvest
Paraplegic/Youth	56	72	18	146	< 2%
Archery	2,823	1,107	257	4,187	41%
Shotgun	2,187	1,549	400	4,136	41%
Primitive	767	732	134	1,633	16%
State	**5,833**	**3,460**	**809**	**10,102**	**100%**

Table 1. The 2015 white-tailed deer harvest by season and sex/age class in Massachusetts.

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 (WMZ; Fig. 2). Overall, we've met or are very close to our deer density management ranges in the western and central parts of the state (Figs. 2 and 3). However, some areas in the central and western WMZs appear to be on the lower end of our management range, so antlerless permit allocation has remained at a low level to stabilize or increase numbers, which led to fewer deer being harvested (Fig. 1 and Table 2). Conversely, deer densities in the eastern part of the state are still above our management range, so antlerless permit allocations have remained high in an effort to increase the harvest of females. However, challenges still remain in eastern MA because of the lack of hunter-access in more developed areas, which limits our ability to reduce deer numbers.

The ADP allocation for 2015 was 42,375 permits (no change from 2014). However, 36,797 permits (87% of allocated) were actually issued in 2015 (Table 2). We determined that the new online system (which started in 2012) and the free convenient way of applying for an antlerless deer permit, led to more hunters applying and fewer returning to play and pay than in previous years. Prior to 2012, we were typically issuing about 95% of the allocated permits in most zones. The decided solution was for the 2014 and 2015 antlerless permit allocation to adjust the model to compensate for the significant proportion of applicants that do not come back to play and pay and the under-harvest associated with

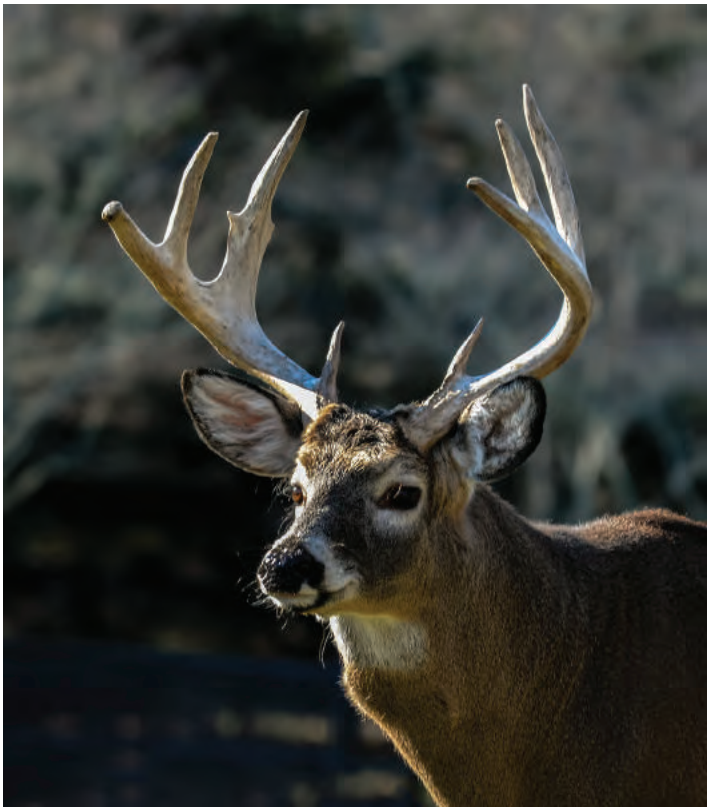


Table 2. The 2015 white-tailed deer harvest by deer sex/age and the number of antlerless deer permits allocated and issued, by WMZ, for Massachusetts (Quabbin excluded).

WMZ	Male	Female	Button Buck	Total	Population Management	2014 Allocation	2014 Issued
1	218	67	8	293	Increase	400	413
2	417	38	8	463	Increase	175	172
3	338	130	18	486	Increase	1,100	1,107
4N	343	79	15	437	Increase	375	398
4S	174	30	6	210	Increase	275	277
5	338	155	21	514	Increase	1,250	1,275
6	84	37	3	124	Increase	450	444
7	294	172	37	503	Stabilize	2,250	2,306
8	358	211	42	611	Increase	2,800	2,746
9	519	315	63	897	Stabilize	4,100	3,932
10	918	843	173	1,934	Reduce	12,000	10,780
11	1,231	756	186	2,173	Reduce	11,000	8,981
12	121	51	15	187	Stabilize	800	793
13	251	272	84	607	Reduce	2,700	1,752
14	210	283	122	615	Reduce	2,700	1,421
Statewide	**5,814**	**3,439**	**801**	**10,054**		**42,375**	**36,797**

Figure 2. Map depicting management ranges for the 15 Wildlife Management Zones in Massachusetts, which satisfy the statewide deer management goal of keeping deer densities below the level where major impacts are seen to the habitat, but in balance with social desires/tolerance.

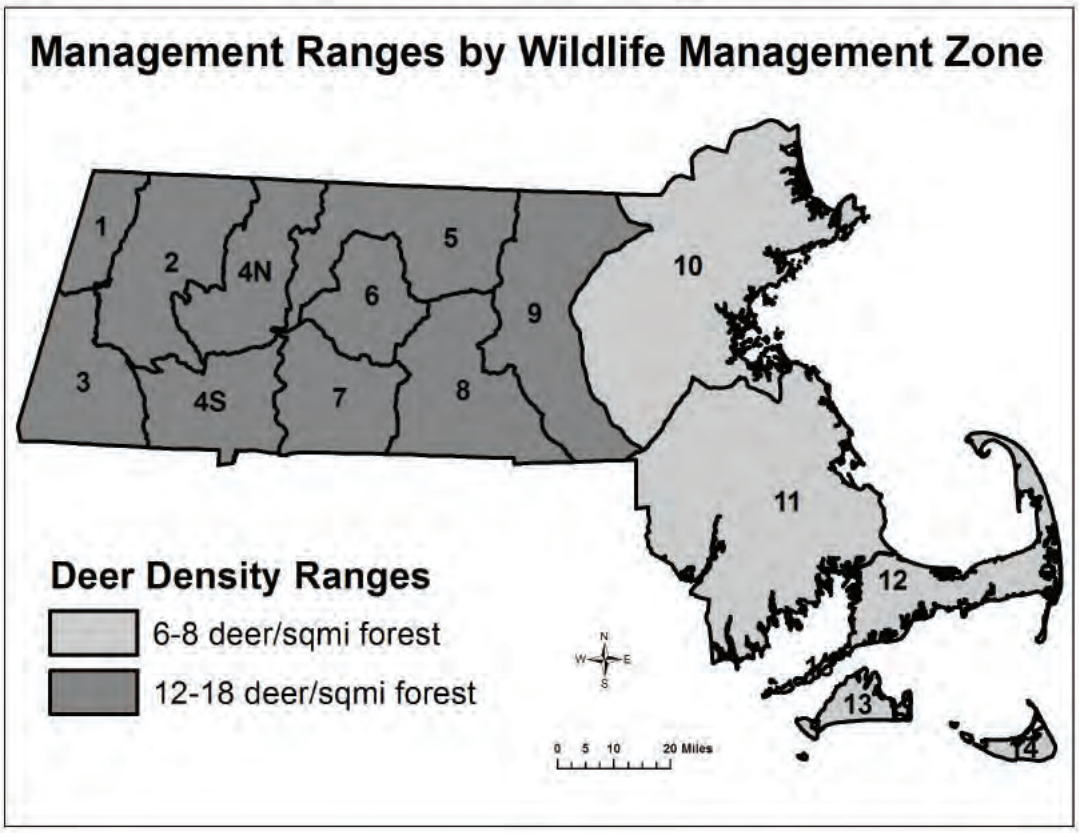
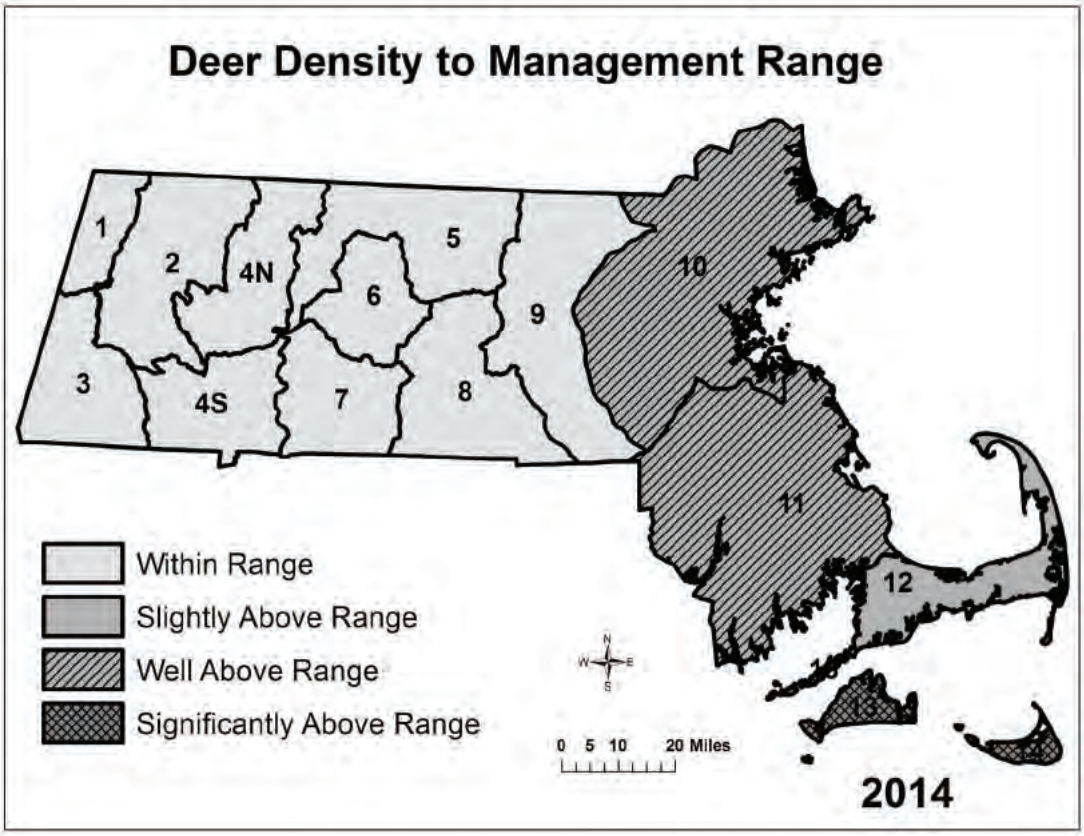


Figure 3. Map depicting how the current deer densities relate to the management ranges for the 15 Wildlife Management Zones in Massachusetts.



the permit under-issuance.

Chronic Wasting Disease

Funding provided by the USDA APHIS ceased in early 2012, thus we did not collect or test any hunter harvested deer in 2015. We did not have any reported deer exhibiting symptoms or signs of disease. We will continue to sample for CWD from suspect deer provided we can allocate the funds required for testing.

Moose Program (David Stainbrook, Deer and Moose Program Leader)

Traditionally, MassWildlife has collected reported data of moose-vehicle accidents (MVA). In 2015, 20 MVAs were reported. However, MVAs are not routinely being reported to MassWildlife or to the MA Environmental Police; thus, these reports make up only a 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 (Fig. 4; reporting rate 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. The number of reports per town can be useful when making decisions about areas to focus on with signage on highways (Figure 5).

The current moose population in Massachusetts is estimated to be around 1000 animals. We use 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 hunter observation data can be used to map moose distribution across the state (Fig. 6).

Chronic Wasting Disease

Funding provided by the USDA APHIS ceased in early 2012, thus we did not collect or test any moose in 2015. We will sample for CWD in suspect moose provided we can allocate the funds required for testing.

Figure 4. Total moose-vehicle accidents reported per year from 1980 to 2015 in Massachusetts.

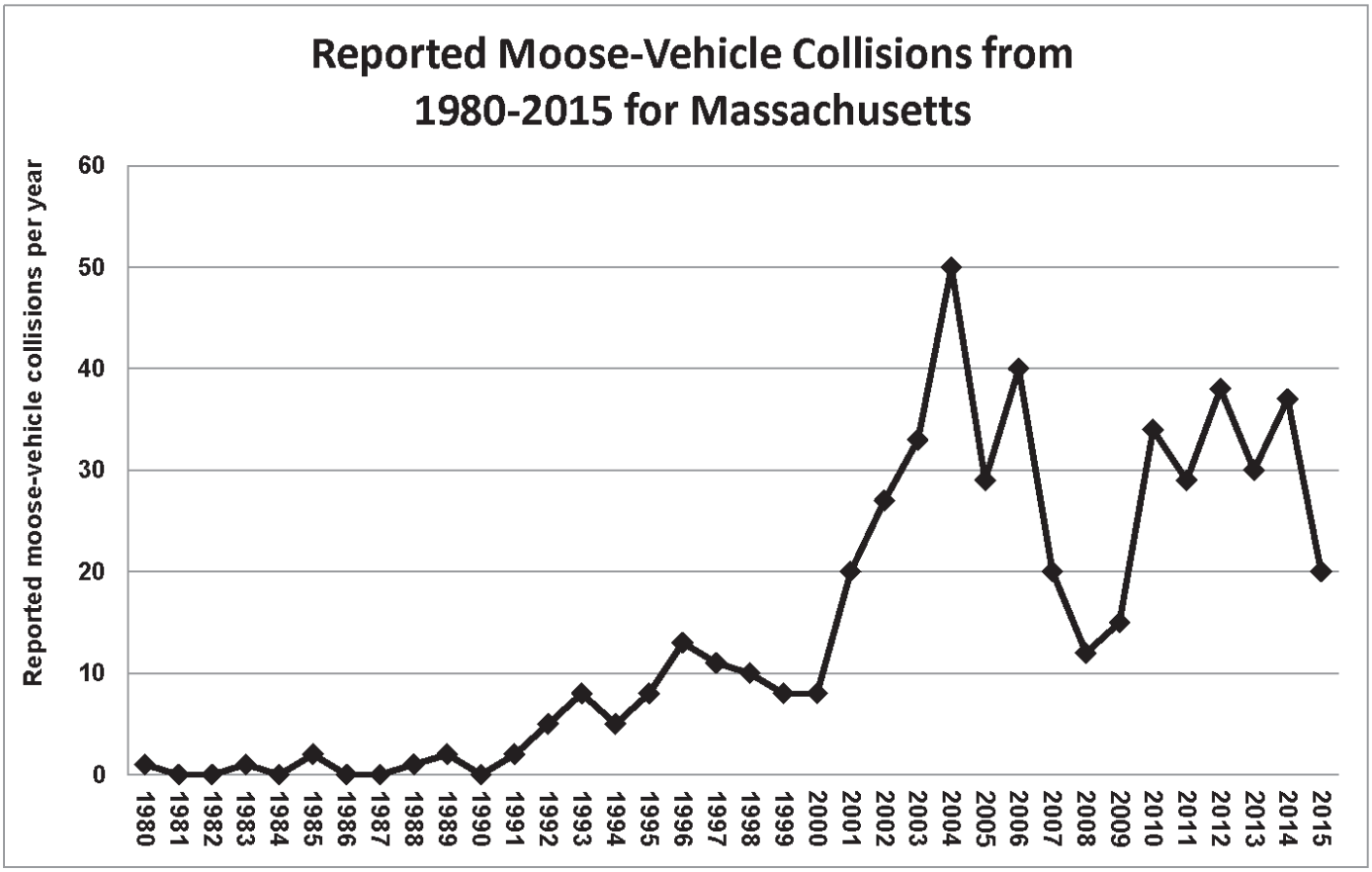


Figure 5. Total number of moose-vehicle accidents reported by town from 1980 to 2015 in Massachusetts.

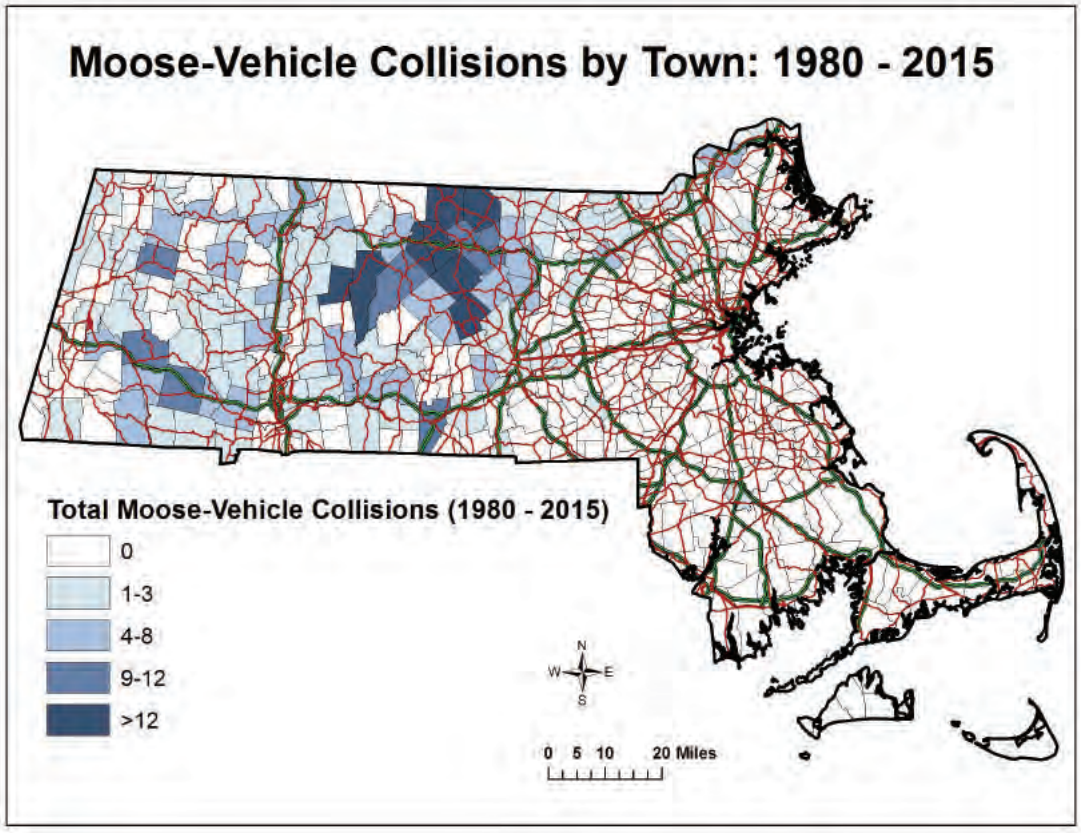
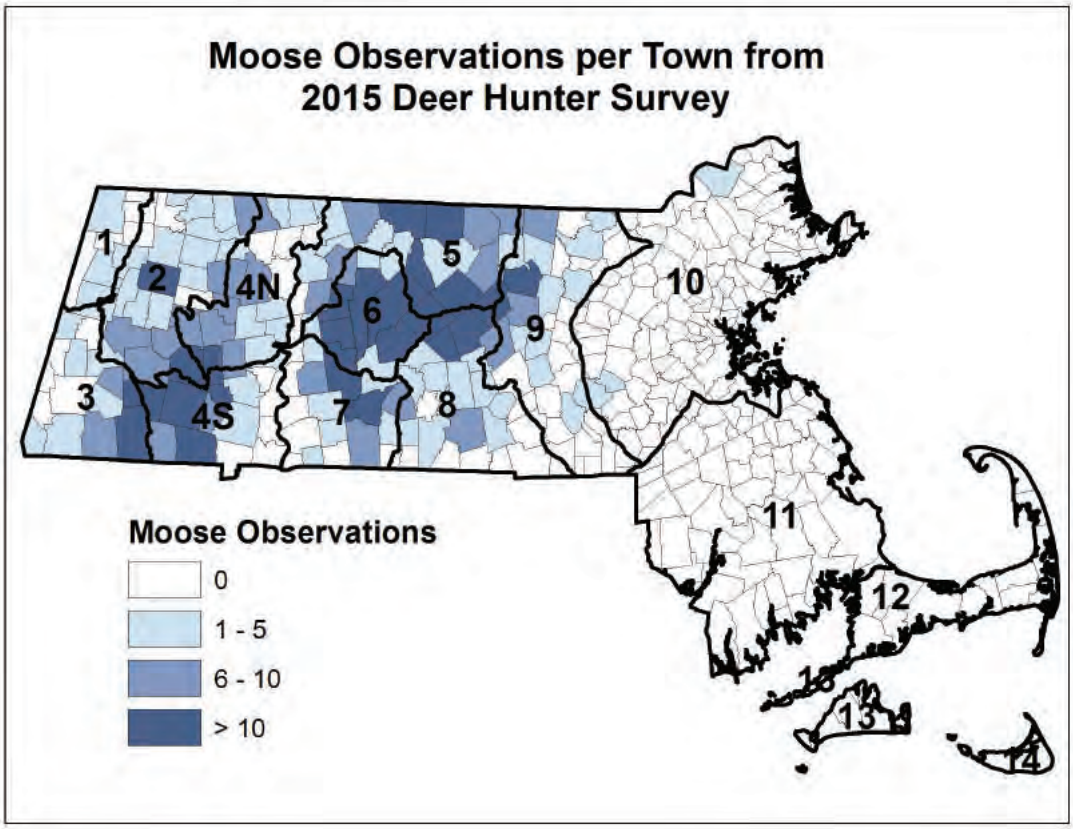


Figure 6. Observations of moose by town reported in the 2015 hunter survey in Massachusetts.



The Human-Wildlife Conflict Trends Project
Trina Moruzzi, Wildlife Biologist

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 public. Reports are recorded as given by the individual therefore, are not considered accurate with regards 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 we developed a new online data collection system and emphasized the importance of rigorous data collection. The new data collection system gave us the ability to better categorize reports by providing the collector with a set of standard report types from which to choose. Also, we were able to collect data on the type of concern associated with the report. The new system has made data collection and data entry more efficient by first, allowing for multiple reports per page and second, by not requiring the collector to describe the report type therefore, not requiring staff person entering the data to subjectively interpret and categorize the report type. Also, we have emphasized the importance of collecting data for all reports regardless of species, location, report, or concern.

Summaries include, but are not limited to, graphs displaying differences in volume of report type, concern type, species, and season. Maps are developed using Massachusetts Geographic Information Systems (MassGIS) to geographically display the distribution of reports by type and species. These summaries are meant to provide district biologists with information to assist them when providing advice and management options to the general public regarding human-wildlife interactions/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 DFW offices regarding a variety of wildlife-related issues.

Via the new system, human-wildlife interactions were recorded in 272 of 351 towns across Massachusetts, totaling 1009 (Fig. 1) from July 2015 to June 2016. Ninety-five percent of records (965) contained a species, 98% (985) contained a report type, 98% (993) contained a concern type, and 94% (944) contained a town.

We received reports of 46 different species, of which 14 made up over 75% of all reports (Fig. 2). We received more reports in July (153, 15%) than any other month followed by May (147, 14%), June (139, 14%), and April (101, 10%) (Fig. 3). The highest number of reports were of property damage (451, 45%) and the least number of reports were of public safety (50, 3%). Reports involving threats to public safety include; wildlife found inside a dwelling, wildlife approaching humans and/or pets on a leash, aggression toward humans, and human attack. Of the 50 reports of threat to public safety, 1 was reported as human attack and involved a coyote.

Ease of data entry via an electronic form accounts for the increased number of reports collected. The new animal report form seems to have improved MassWildlife staff's ability to collect more objective and robust data regarding human-wildlife interactions. Capturing more diverse human-wildlife conflict data may be the result of several factors; an increased emphasis on collection effort, the implementation of a new electronic animal report form, an actual increase in conflicts, or a combination of some or all of these factors. Regardless, MassWildlife staff has found data collection and data entry to be more efficient. Also, the new animal report form has proven effective at capturing more robust and less subjective data. Collecting these types of data, affords an opportunity to conduct more in depth analyses. For example, data analysis indicates that in areas where percentage of forest increases, interactions decrease. Understanding the relationship between landscape and interactions can help MassWildlife staff focus management strategies such as education.

Summarizing reports of interactions gives us the power to better inform both the public and MassWildlife biologists. Summary information can also be used to uncover trends in interactions both spatially and temporally. Total report density across towns has remained relatively consistent over time. In general, major metropolitan areas tend to report more interactions between humans and wildlife than do more rural settings. Also, the proportion of report type is nearly identical from last year to this year, and the three most common species reported remain bear, coyote, and fox.

We can 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, we 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, we will utilize summaries of past year's data to inform Information and Education (I & E) staff on the type(s)

of interactions the public should expect. I & E staff can 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 our ability to predict the timing of influxes of specific reports of interactions. It is likely that many of the negative interactions between humans and wildlife reported to our 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).

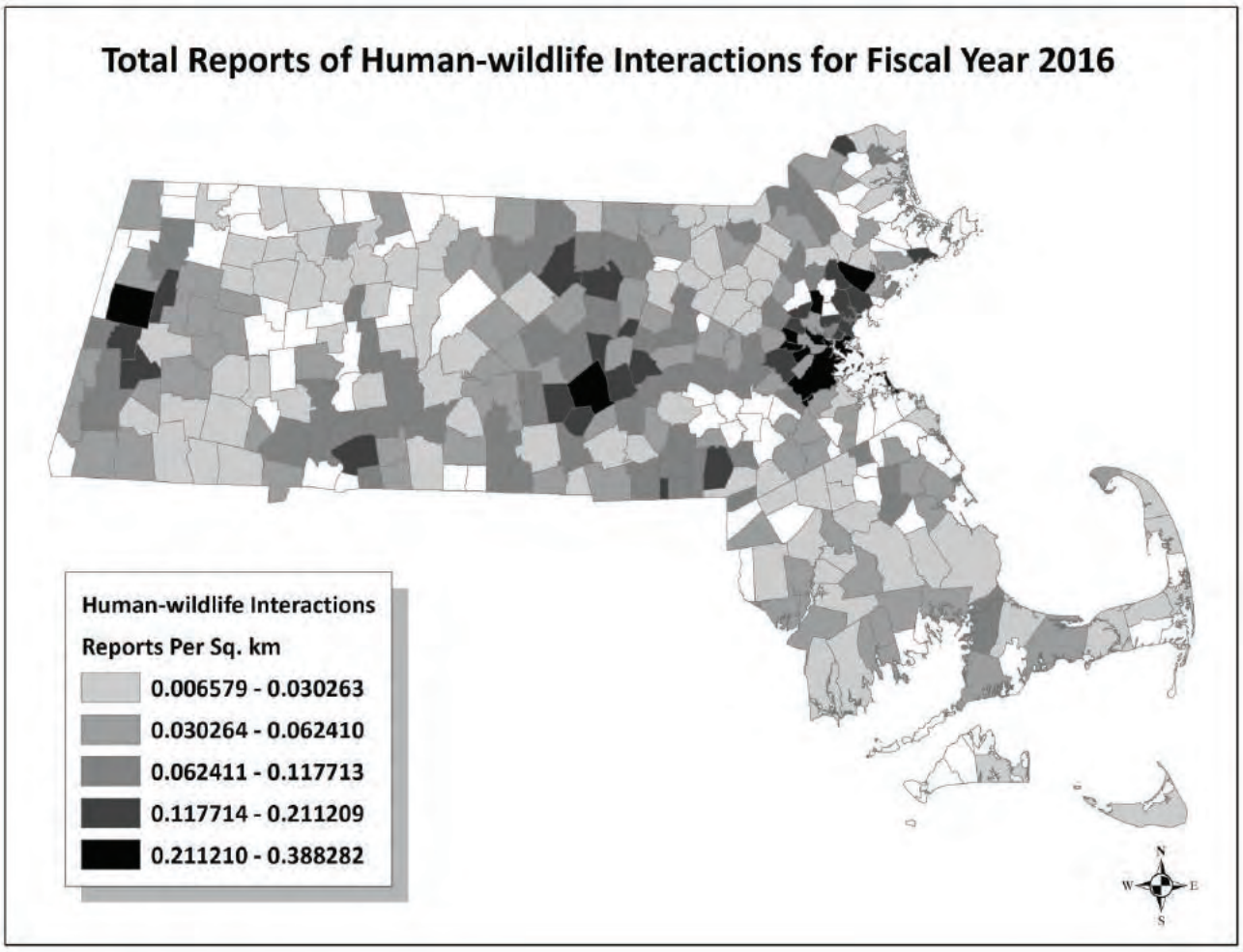


Figure 1

Common Species Reported – July 2015 through June 2016

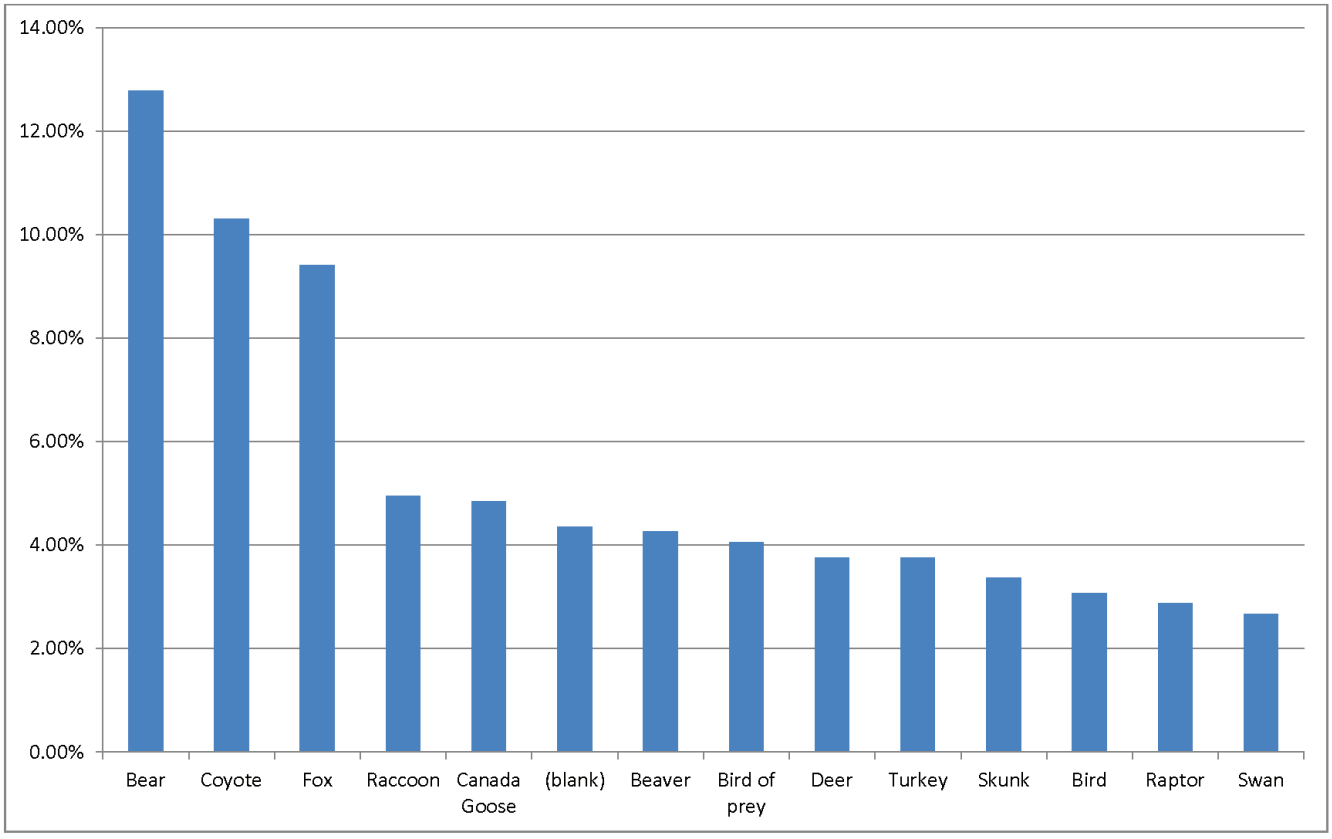


Figure 2

Total Reports Monthly – July 2015 through June 2016

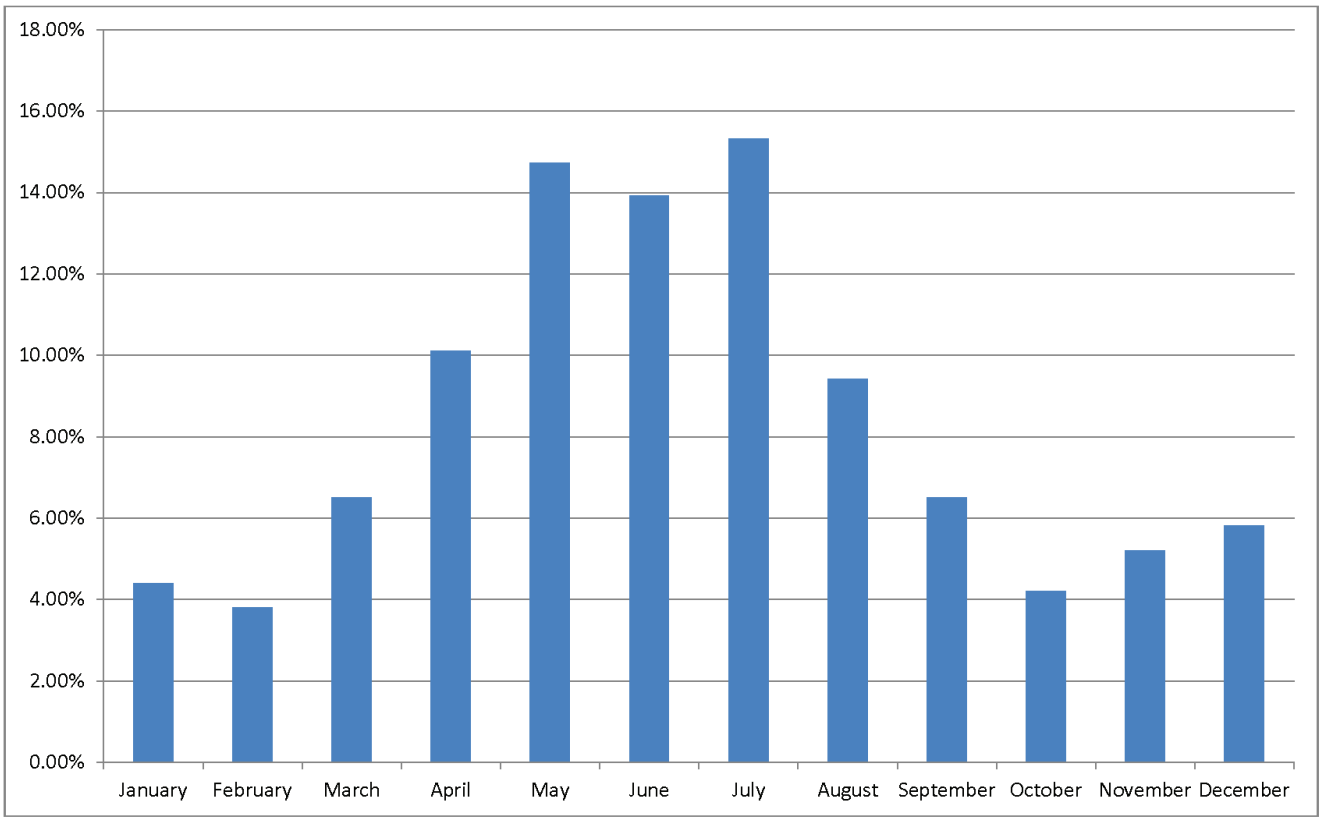


Figure 3

Private Lands Habitat Management

Marianne Piché, Habitat Biologist

Overview

In Massachusetts 80% of the land base is privately owned. Many State Wildlife Action Plan (SWAP) Species are found on these lands. These species have been identified as species in greatest conservation need of protection—some are rare or endangered, others include game species. The SWAP identifies habitat restoration and management as a strategy essential to the conservation of these species. Although MassWildlife and other conservation organizations across the Commonwealth have made unprecedented investments in land acquisition, acquisition alone is not enough to guarantee the persistence of the Commonwealth's biological diversity. Investment in habitat restoration and management is urgently needed on public and private lands across the state. To address this need, MassWildlife is substantially increasing its investment in habitat management activities on its properties and is committed to working with partners including private landowners to promote these efforts on other conserved lands across the state. MassWildlife understands that significant investments in habitat management will be required to protect the integrity of the Commonwealth's open space - ensuring that what we worked so hard to conserve will be there for future generations.

Administrative and staff changes in FY16 The NRCS Habitat Biologist Marianne Piché was folded into the Wildlife Section under the Habitat Management Program and Mike Sawyers, Federal Aid Coordinator is now in the Administration section under the supervision of CFO Kris McCarthy. For purposes of this Annual Report, this will be the last year that this report will be filed separately.

Landowner Incentive Program

The federal government did not fund the Landowner Incentive Program (LIP) in FY 16. See Federal Aid report for more details.

MassWildlife Habitat Management Grant Program

With funding from environmental bonds through the Executive Office of Energy and Environmental Affairs, a new wildlife management habitat grant program was initiated and administered by MassWildlife. Land protection alone is not sufficient for the needs of some kinds of wildlife, including many of our most popular game species. Recognizing that 80% of land in Massachusetts is privately owned, the MassWildlife Habitat Management Grant Program (MHMGP) was developed to establish partnerships between MassWildlife and private and municipal landowners to enhance habitat and increase recreational opportunities on conserved properties across the state. The MHMGP program aims to encourage landowners to engage in active habitat management on their properties to maximize the benefit to the various wildlife species of the state. Eligible entities for these grants are owners of private or municipal conserved lands in the Commonwealth of Massachusetts. Conserved land is defined as property protected in fee by an organization whose primary mission is conservation, a conservation restriction, land enrolled in Chapter 61,61A/B, or land that has a current Landowner Incentive Program covenant.

The kick off announcement of the program took place in October 2015 at a MassWildlife habitat conference held at the Westborough Field Headquarters. Though there was a tight window for application receipt, 33 applications were received and ranked. In January, the grant awards totaling $320,464 were awarded to 13 municipalities and organizations:

- Athol—Using $24,610 in grant funds, the Town of Athol Conservation Commission will conduct forestry activities to create young forest habitats on Athol's Bearsden Conservation Area.
- Brookfield and Ware — The East Quabbin Land Trust has been awarded $16,730 to use fire to promote native wildlife in Pitch Pine-Scrub Oak and wet meadow habitats on Frohloff Farm and Wendemuth Meadow Preserve.
- Dartmouth—The Dartmouth Natural Resources Trust has been awarded $18,096 for young forest habitat creation and restoration at Smith Farm Reserve.
- Edgartown — The Nature Conservancy has been awarded $32,908 to conduct prescribed burns to maintain sandplain grassland habitat on the Katama Plains Conservation Area.
- Great Barrington— For $20,900, the Berkshire Natural Resources Council will work to control invasive plants on the Housatonic Flats Reserve.
- Hardwick —The East Quabbin Land Trust has been awarded $16,290 to maintain and promote shrubland and to treat invasive species of plants.
- Heath— The Franklin Land Trust will be using $19,899 to create young forest habitat and remove in-

vasive plants on Crowningshield Farm.

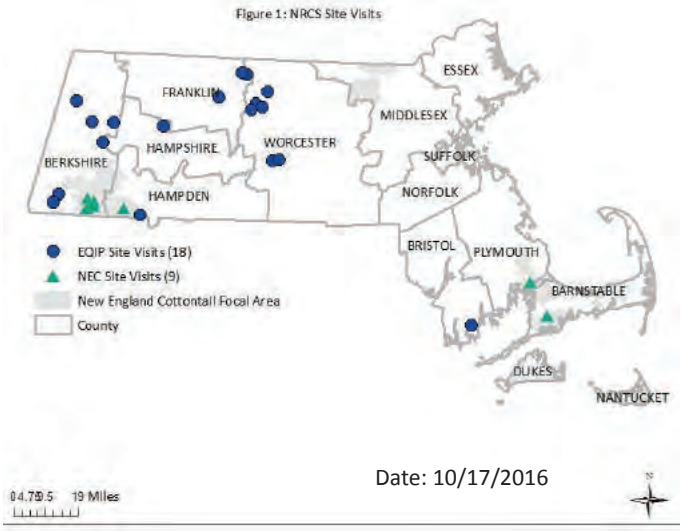
- Monson—The Town of Monson has been awarded $27,750 to restore young forest habitat on its Carpenter Road property.
- Nantucket —For $20,357, the Nantucket Conservation Foundation reduce shrub and tree species cover to improve habitat conditions for wildlife dependent on young forests and shrublands.
- Sheffield — The Nature Conservancy has been awarded $49,480 to improve fen and grassland habitats through invasive plant control and removal of woody plants on the Schenob Brook Preserve.
- Sheffield — The Trustees of Reservations has been awarded $33,000 to restore grassland habitat on the West Grumpelt Parcel of Bartholemew's Cobble Preserve.
- Wilbraham—Using $11,600 in grant funds, the Town of Wilbraham will treat invasive species and improve young forest habitat at the Thayer Brook Conservation Area.
- Wilbraham—Using $28,844 in grant funds, the Town of Wilbraham will treat invasive plants, improve young forest habitat, and install shelter for wildlife on its Twelve Mile Brook Conservation Area.

MassWildlife-NRCS Habitat Management Partnership
Marianne Piché, NRCS Habitat Biologist

The United States Department of Agriculture's Natural Resources Conservation Service (NRCS) provides financial and technical assistance to private landowners to address natural resource concerns including wildlife habitat. To ensure that Massachusetts NRCS activities and resources result in maximum benefits to SWAP Species, MassWildlife and NRCS have developed a strong partnership. MassWildlife provides NRCS with the services of a Habitat Biologist who is responsible for preparing site specific habitat management recommendations for NRCS staff to develop conservation plans benefitting State Wildlife Action Plan Species. The Habitat Biologist is also responsible for serving as the liaison between NRCS and MassWildlife on the Conservation Strategy for the New England Cottontail. Because MassWildlife is the state agency responsible for the restoration, conservation, and management of fish and wildlife resources in Massachusetts, and NRCS has financial assistance programs that can enhance wildlife habitat, both agencies benefit.

During FY16, the Habitat Biologist participated in 27 site visits to plan a variety of habitat management projects with 9 specifically targeting New England Cottontail (Figure 1). The Habitat Biologist prepared a total of 23 habitat management proposals with 9 focusing on New England Cottontail. Applications selected for funding exceeded the available state allocation and additional monies were requested and received. 12 applications were awarded assistance, 4 of which were for New England Cottontail habitat management. NRCS contracts entered into by the 12 landowners include plans for 475.1 acres of management and totaled $240,193.80. Management will involve 66 acres of young forest habitat creation, 40 acres of pitch pine-oak woodland prescribed fire treatment, 30 acres of upland forest habitat enhancement, and 90 acres of invasive plant species control. In addition, $449.00 was awarded under the NRCS Conservation Activity Plan funding pool for a Prescribed Burn Plan. The 2014 Farm Bill set 5% as an annual nationwide minimum for the amount of available funds to be allocated to wildlife habitat management under the Environmental Quality Incentives Program. In Massachusetts, 5.4% of FY16 funding was allocated for wildlife habitat management contracts.

The Habitat Biologist organized or participated in 6 activities to promote the use of NRCS funding programs. In addition, 10 letters were sent to landowners informing them about opportunities to engage in New England Cottontail conservation. The Habitat Biologist continued to coordinate multi-agency New England Cottontail Land Management Team meetings and participate in New England Cottontail Technical Committee activities and work groups. The Habitat Biologist also worked with Wildlife Management Institute staff to develop a story about a landowner's New England Cottontail project that is featured on the New England Cottontail website. Data and summaries pertaining to private lands conservation efforts for New England Cottontail were also prepared to be included in the 2016 New England Cottontail Performance Report. The Habitat Biologist also represented Massachusetts at the annual Northeast Habitat Technical Committee meeting.



Natural Heritage and Endangered Species Program

Thomas W. French, Ph.D.
Assistant Director, NHESP

Rare Species Habitat Mapping

The NHESP continued to delineate and revise habitat "footprint" polygons for each new observation record for the 432 rare plant and animal species currently listed under the Massachusetts Endangered Species Act (MESA). Revisions and updates were also made to habitat maps based on new information, including new aerial photography, parcel data, the expiration of records (observation records more than 25 years old are considered to be "historic"), and new biological data which may increase NHESP's understanding of habitat utilization. These species-specific habitats are used in much of the work conducted by NHESP staff—from land protection, to habitat management and to advise the regulatory mapping to be included in the 14th Edition of the Natural Heritage Atlas, which is expected to be released in early 2017 after a public comment period.

Vernal Pool and Rare Species Information System (VPRS)
During FY16, 178 new people signed up for VPRS, submitting a total of 1678 observation reports, including 172 vernal pool certification forms, 424 rare plant observation forms, and 1082 rare animal observation forms. Once submitted through VPRS, the information is reviewed by NHESP using standard data acceptance criteria for inclusion in the database, and the accepted records are entered into the database by NHESP Data Staff. In addition to the observation reports submitted through VPRS, NHESP Data Staff processed 9 large reports for Common Loon, Piping Plover, and 4 species of MESA-listed terns.

Linking Landscapes for Massachusetts Wildlife

In 2008, MassWildlife and its 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.

Linking Landscapes for Massachusetts Wildlife (LLMW), a long-term and multifaceted volunteer-based monitoring program and planning collaboration utilizes 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 FY16, LLMW installed 2 collapsible turtle crossing signs in one of the highest risk sites identified by the Northeast Blanding's Turtle Working Group.

In addition to community engagement through citizen science in FY16, LLMW has installed improved crossing structures and wildlife barriers to enhance public safety and protect endangered species; implemented invasive species control and habitat restoration of scenic uplands and calcareous wetlands that are hotspots for biodiversity; engaged with community organizations, installed nesting structures for cliff swallows, a declining species; installed and monitored six Peregrine Falcon nest boxes on bridges; and maintained a new interactive website.

2015 Field Season Summary

Birds

Piping Plover; Federally Threatened

MassWildlife coordinated annual monitoring and protection efforts for Piping Plovers conducted by a coastwide network of cooperators. Observers reported breeding pairs of Piping Plovers at 155 sites. The population increased 3.5% relative to 2014. The Index Count (statewide census conducted 1-9 June) was 663 pairs, and the Adjusted Total Count (estimated total number of breeding pairs statewide for the entire 2015 breeding season) was 687 pairs. A total of 866 chicks were reported fledged in 2015, for an overall productivity

of 1.29 fledglings per pair, based on data from 98% of pairs.

American Oystercatcher

MassWildlife also coordinated annual monitoring and protection efforts for American Oystercatchers conducted by a coastwide network of cooperators. Over 250 sites were surveyed during May and early June 2015. Preliminary results indicate that Massachusetts supported approximately 180 breeding pairs of oystercatchers in 2015.

Terns, Laughing Gulls, and Black Skimmers

Cooperators in Massachusetts surveyed approximately 140 coastal sites in 2014 for the presence of breeding Roseate Terns (Sterna dougallii), Common Terns (Sterna hirundo), Arctic Terns (Sterna paradisaea), Least Terns (Sternula antillarum), Laughing Gulls (Larus atricilla), and Black Skimmers (Rhynchops niger). Compilation of final census results is still underway. Preliminary tallies include 1,938 pairs of Roseate Terns, 17,191 pairs of Common Terns, 3,625 pairs of Least Terns, 2,183 pairs of Laughing Gulls, 1 pair of Arctic Terns, and 6 pairs of Black Skimmers.

Buzzards Bay Tern Restoration Project

Roseate and Common Tern population sizes in Buzzards Bay in 2015 (8,679 pairs) were comparable to numbers in 2014 (8,920 pairs), when the highest number of nesting terns in recent history was documented. Collectively, Bird, Ram, and Penikese Island supported 1,885 "peak season" pairs of Roseate Terns (vs. 1,823 in 2014; +3.4%) and 6,794 "peak season" pairs of Common Terns (vs. 7,096.5 in 2014; -4.3%). This is very close to the record-high number of Common Terns that were recorded in 2014 and is the second highest number of Roseate Terns ever recorded nesting in Buzzards Bay.

Bird Island

Common Terns on Bird Island numbered 2,247 pairs, a small decrease (6%) from the 2014 level (2,391 pairs). This was the third year in a row that Common Terns on Bird Island exceeded the 1,700-1,900 pair range where they had been relatively stable for the previous two decades. After a surprising 45% increase between 2013 and 2014, numbers of Roseate Terns remained steady at 1,127 pairs (vs. 1,121 in 2014), demonstrating that 2014 was not an anomaly. Food resources again appeared to be on the low side for both tern species and productivity was only fair (0.86 fledglings/nest for both species). No major predation events were recorded this year.

Bird Island Habitat Restoration

There was significant progress on the Bird Island Habitat Restoration Project in 2015. In November 2014, the federal partner on the project, the U. S. Army Corps of Engineers (USACE) – New England District, received word that the federal portion of the funding necessary for construction would be secured during federal fiscal year 2015, allowing for construction of the project beginning in September 2015, provided that various milestones were met. This touched off a nine-month whirlwind of activities, including: finalizing the design plans for Bird Island and the mitigation site at Apponagansett Bay, Dartmouth; applying for and securing environmental permits; acquiring from the Town of Marion a USACE-required permanent conservation easement on Bird Island for the Department of Fish & Game; obtaining various temporary construction easements for staging areas; and securing the rest of the non-federal sponsor share (35%) of the total project cost (estimated at over $5 million). Funds for a substantial portion of MassWildlife's share ($780,000) were initially slated to come from Cape Wind Associates; however, the Cape Wind project stalled due to financing issues, so alternative sources of funding were sought. Ultimately, $714,310 was secured from the New Bedford Harbor Trustee Council (NBHTC), and over $900,000 in cash from various state sources to reach MassWildlife's required share.

All deadlines were successfully met, allowing the USACE to put the construction out to bid in August 2015. The low bid ($3,120,000) was from Cashman Dredging and Marine Contracting Co., LLC, which was contracted by the USACE for the project. The project will be constructed from September 2015 to April 2017, with all on-island construction activities occurring outside of the tern nesting season.

Ram Island

Common Tern numbers on Ram Island declined 12% to 3,330 pairs (vs. 3,790 in 2014), but were still strong. Productivity was low (0.69 fledglings/nest vs. 0.58). Roseate Tern numbers increased (+8%) to 735 pairs, the highest estimate in over a decade (vs. 682 in 2014). Productivity was fair (0.87 fledglings/pair vs. 1.31). As was the case at Bird Island, food was a limiting factor at Ram Island for both species. Great Black-backed Gull predation on Common Tern chicks also appeared to be problematic.

Penikese Island

As predation pressures on Penikese Isl. continued to wane, Common Tern numbers rebounded. In 2015, there was a 33% increase to a recent historic high (by a small margin) of 1,217 pairs (vs. 915.5 in 2014). Productivity was very good at 1.43 fledglings/nest (vs. 1.04). Roseate Terns increased

slightly from 20 pairs to 23 pairs; productivity was very good (1.12 vs.1.08 fledglings/nest). An Arctic Tern pair nested and hatched chicks, but fledging success was unknown.

Penikese Island Habitat Restoration

Habitat restoration on Penikese (funded by NBHTC, the U.S. Fish and Wildlife Service (USFWS), and mitigation funds) involves using fire and herbicide to change vegetative composition and structure so that terns can expand from the narrow, rocky nesting beach into the uplands, where they will be more secure from predators and overwash. A combination of fire and herbicide is necessary in this effort, as burning is ineffective in controlling some invasive species and actually exacerbates the coverage of others. Burns were conducted in 2011, 2012, and 2014. The island was treated with herbicide in 2012, 2013, and 2014.

MassWildlife staff and volunteers (including students from Bristol County Agricultural High School-Natural Resource Management Department; BCAHS-NRM) planted several thousand plugs of native grasses and wildflowers over 1 acre of the island last fall. In 2015, that aspect of the project received both local and national recognition. In recognition of their work, BCAHS-NRM received a 2015 Secretary's Award for Excellence in Energy and Environmental Education from the MA Executive Office of Energy and Environmental Affairs. In August 2015, the White House posted a photograph on Instagram of BCAHS-NRM students planting plugs of native plants on Penikese. One of the planted areas near the tern colony did support a Common Tern nest; however, most of the areas became heavily vegetated with undesirable vegetation. Going forward, a strategy to address this issue will need to be developed.

In April 2015, large plots (~4 ac total) for the seeding of native grasses were developed to help jump-start the establishment of native vegetation in areas previously dominated by invasive species. The logistics for this operation were considerable. New England Harbor Services (Georges Mills, NH) was contracted to load, transport, and offload farming machinery onto Penikese Island using a crane barge. Heritage Fields (Orange, MA) was contracted to move farming machinery to and from the mainland waterfront and to mow, rake, till, and seed the designated areas on Penikese. The success of this work is still being evaluated.

Common Loon

In 2015, personnel from MassWildlife, the Massachusetts Department of Conservation and Recreation (DCR), and the Biodiversity Research Institute (BRI) monitored Common Loon (Gavia immer) activity in central and western Massachusetts from May until September. Eighty-three lakes were surveyed. Forty-five territorial loon pairs and 34 nesting pairs were found. Thirty chicks were presumed to have survived to fledging, which resulted in a productivity value of 0.88 fledglings per nesting pair (0.67 fledglings per territorial pair). From July to September, seven loon chicks from the Adirondack region of New York were reared on, or released directly into, the Assawompset Pond complex in Lakeville, MA under a collaborative project between BRI and the state wildlife agencies in Massachusetts and New York.

Bald Eagle

During the summer of 2015, there were 51 known territorial pairs of Bald Eagles in Massachusetts. This is 4 more pairs than in 2014, but includes pairs that relocated and their new nest sites have not yet been located. The highest concentrations of eagles were along the Connecticut River (11 territories) and Quabbin Reservoir (8 territories). New nests were documented in Waltham, Lynnfield, and Otis. New territorial pairs without any known nests were documented in Sturbridge, Milton, Westminster, Westport, and Mashpee. Of the 51 documented pairs, at least 23 pairs successfully fledged 37 chicks. Of the 37 known chicks that fledged, 29 (78%) were banded by agency staff. In 2012, 2013 and 2014, there were 39, 40, and 47 documented territorial pairs, respectively, which produced 33, 46, and 60 fledged chicks. Although there was a record high number of territorial pairs documented in Massachusetts in 2015, breeding productivity was relatively low, likely a result of the long winter resulting in unseasonably cold and snowy weather conditions through much of the nesting period.
This is the 27th year that Bald Eagles have raised young in Massachusetts since their restoration. During these 27 years, at least 583 wild-born chicks are known to have fledged, and an additional 9 chicks that were captive-born and fostered have fledged (592 chicks in total).

Nesting Bald Eagle Survey

The 2015 Spring Nesting Eagle Survey took place on April 10, 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. In total, 30 volunteers participated in the count to assist MassWildlife staff in the increasingly difficult task of monitoring the state's growing numbers of breeding Bald Eagles. The high amount of effort on this single day provides the bulk of information that is gathered on the annual number of territorial and nesting Bald Eagles in the state. In addition to the single day count, information on nesting eagles is gathered opportunistically throughout the year.

Peregrine Falcon

During the 2015 nesting season, 33 nesting pairs of Peregrine Falcons were confirmed. Of the 33 nesting pairs this year, 8 were not monitored closely enough to know their outcome. Of the 25 monitored pairs, 1 pair did not lay eggs, 4 pairs failed, and 20 pairs successfully fledged at least 54 chicks (41 chicks were banded (76%) from 15 nests). This is the largest number of chicks fledged in any single year to date. This is the 29th year that Peregrine Falcons have raised young in Massachusetts since their restoration. During these 29 years, at least 535 wild-born chicks are known to have fledged.

Grassland Bird Plan

As a follow up to the recommendations provided in the Action Plan for the Conservation of State-listed Obligate Grassland Birds in Massachusetts that was produced in 2013, grassland bird surveys were conducted at sites known to support nesting Grasshopper Sparrow and/or Upland Sandpiper. These surveys were conducted in 2014 and 2015 and represented a collaborative effort between DFW and the Massachusetts Audubon Society. Surveys were composed of 10 minute point counts where the distance between each bird and the observer was estimated in order to generate detection probabilities and ultimately bird densities. Point counts were conducted in the morning (sunrise-10am), were separated by >250m, and were > 100m from the forest edge whenever possible. The number of point counts at individual sites ranged from 2-20 depending on the size of the site. The species recorded during the surveys were Upland Sandpiper, Grasshopper Sparrow, Vesper Sparrow, Eastern Meadowlark, Bobolink, Savannah Sparrow, Horned Lark, Killdeer, American Kestrel, and Northern Harrier.

During the 2 years of sampling, 30 grassland bird sites were surveyed, and whenever possible each point was visited twice. However, due to scheduling and/or access limitations, points at 8 sites were only visited once. The most commonly detected species were Savannah Sparrow (26 sites), Killdeer (21 sites), Eastern Meadowlark (14 sites), Grasshopper Sparrow (13 sites) and Upland Sandpiper (9 sites). The state-listed Upland Sandpiper and Grasshopper Sparrow were detected at the larger grasslands including military bases, several municipal airports, and a few wildlife management areas (WMAs). For Upland Sandpipers, all but one pair was detected on military installations or airports. By far the most Upland Sandpipers were observed on the Westover Air Reserve Base (in Chicopee), which is thought to be the best single site in New England for this species and the Grasshopper Sparrow. The Grasshopper Sparrow followed a similar pattern as the Upland Sandpiper, but was found at more sites, including three WMAs (Frances Crane, Southwick, and Bolton Flats) that are being managed specifically to promote the native grassland ecosystem.

These results reaffirmed that military installations and municipal airports are critical for maintaining sustainable populations of Upland Sandpiper and Grasshopper Sparrow in Massachusetts, and MassWildlife continues to work with managers at these sites to support strategies that promote grassland bird conservation while upholding aircraft safety. A single pair of Upland Sandpiper was documented at the Frances Crane WMA, which is being actively managed for state-listed grassland birds, and the grassland is currently being enlarged to encompass 400 acres. To address the goal of maintaining sustainable populations of state-listed grassland birds, MassWildlife will continue to work in a collaborative manner to support grassland bird conservation on military and municipal airport properties and manage for large patches of native grassland habitat on select MassWildlife properties.

Reptiles and Amphibians

Northern Red-bellied Cooter; Federally Endangered

For the 31st consecutive year, a concerted effort was made to locate Northern Red-bellied Cooter (Pseudemys rubriventris) nests at Federal Pond in Carver and place wire cages over them in order to prevent predation by red foxes, coyotes, raccoons, and skunks. A total of 55 P. rubriventris nests were successfully caged at Federal Pond by MassWildlife contractor John Crane. The caged nests contained a total of 753 eggs from which 453 living hatchlings emerged, averaging 8.2 hatchlings per nest. A total of 143 hatchlings were retained for the 2015-2016 headstarting program: 137 from Federal Pond, three from Great South Pond, and three from Crooked Pond. The remaining live hatchlings were mostly released at Federal Pond, although ten were released at Great South Pond.

A total of 135 hatchlings from 2014 were headstarted by 24 cooperating organizations and individuals across Massachusetts. One hundred and thirty-four headstarted turtles were released in May 2015 to Burrage Pond WMA (n=89), East Head Reservoir (n=35), and Crooked Pond (n=10). An additional headstart was released at Great South Pond. From 1984 to 2015, a total of 3,908 headstarted Northern Red-bellied Cooters have been released by MassWildlife and partners nine months following hatching.

A third field season of intensive field work was conducted to assess the long-term, intensive, headstart program and to evaluate the status of certain representative or priority populations, including most of the original occurrences of P. rubriventris. Mark-recapture work continued at East Head and

Island Ponds and was initiated at Gunners Exchange, Hoyts, Boot, Great South, Ingalls, Sampson, and Federal Ponds. The expanded effort in 2015 was part of a new partnership with Antioch University New England, the University of Massachusetts Amherst, and the Eastern Massachusetts National Wildlife Refuge Complex. Ponds with documented natural occurrences were studied as well as ponds with populations introduced through the "headstarting" program. The size and demographic structure of populations of critical conservation significance, including the core complex of "original" ponds encompassing most of the historical extent of occurrences for this federally-listed geographically distinct population, as well as the ponds with the largest investment of headstarted turtles. From data collected between 2014 and 2015, the annual survivorship rate of headstarted turtles in three "introduced" (i.e., headstart-only) populations was estimated to be 0.91, 0.97, and 0.98. Estimated recruitment rate per female reproductive year averaged 0.048, 0.076, and 0.226 per female per year. Despite many assumptions that are difficult to adequately evaluate, two of three introduced populations appear to be stable, and one appears to be declining. The primary source pond for headstarted turtles has apparently not increased significantly in the past twenty years. The total estimated population size within the focal study ponds is 847 individuals, excluding recent headstarted turtles [i.e., those released between 2013–2015]. Preliminary results indicate that the multi-decade headstart program has more than quadrupled the number of resident turtles in central Plymouth County, and has apparently established at least two new, introduced, reproducing and recruiting populations. In this instance of severe population decline or collapse of a freshwater turtle, headstarting has evidently been an effective tool for recovery.

Bog Turtle

Formal population monitoring was conducted at the two known extant bog turtle sites in 2015. At one site, selective canopy tree and shrub removal was undertaken by The Nature Conservancy under contract with MassWildlife. At the other site, prescribed cattle grazing continued under a contract initiated in 2013; three beaver deceiver/flow devices were maintained by MassWildlife Western District staff and NHESP staff, and beaver were trapped to reduce flooding pressure on sensitive fen habitats. Significant progress has been made managing water levels and controlling invasive plants. Further, MassWildlife received funds from a regional, USFWS-funded Competitive State Wildlife Grant to conduct distributional surveys, nesting area improvements, and habitat management.

Blanding's Turtle

MassWildlife participated in the fifth year of a regional conservation planning effort for Blanding's turtle supported by a Competitive State Wildlife Grant. MassWildlife also provided funding for Blanding's Turtle conservation projects to benefit the Borderland State Park population and the Parker River population through contracts with Grassroots Wildlife Conservation and Parker River Clean Water Association. Both partnerships are guided by site-level management plans developed in 2014 with funds from the USFWS. The Borderland work includes trapping and radio tracking adult females in order to identify and protect nests to facilitate headstarting in a population with reduced or minimal recruitment of juveniles. The Groveland/Parker River work included a new effort to construct nesting habitat away from busy roads and an industrial park where Blanding's turtles have nested every year since at least 2002. The new effort to create nesting habitat complements a project the year before to construct nesting mounds in an area of cleared forest near known occupied wetlands and was directed by MassWildlife's Northeast District.

Wood Turtle

In 2014, MassWildlife was awarded a Competitive State Wildlife Grant from the USFWS to work with seven partner states and many non-state partners to develop a conservation plan for wood turtles in the Northeastern United States. In 2015 using these federal funds, MassWildlife contracted Lori Johnson to conduct statewide standardized sampling for wood turtles. Eighty-four live wood turtles were observed 96 times at 23 sites across the Commonwealth, building on earlier efforts to assess the distribution of this formerly wide-ranging species and establishing a quantitative baseline for future assessments of demographic and population trends. This work continued in the spring of 2016 through another contract with Lori Johnson. Fifteen streams were sampled across the state, and 51 wood turtles were observed 57 times. Results from both years are being incorporated into a regional Conservation Plan.

Timber Rattlesnake

As of this report, rattlesnake populations have dwindled to five isolated and declining populations. MassWildlife led and managed a multistate effort of Northeastern and Midwestern states, funded by the USFWS's Competitive State Wildlife Grants program to assess the population-level effects of an emerging and poorly understood pathogen, Ophidiomyces ophiodicola (Snake Fungal Disease or "SFD"). One of five remaining populations appears to have been negatively affected by the disease, which caused population declines of unknown magnitude. As part of this effort, MassWildlife contracted with the University of Massachusetts to coordinate the regional effort and to conduct a radiotelemetry study of rattlesnakes at one site in Suffolk County. Addition-

ally, MassWildlife initiated a renewed effort to develop a Conservation Plan for the rattlesnake in the Commonwealth and initiated formal coordination with New Hampshire Fish and Game, Vermont Fish and Wildlife, and Connecticut Department of Energy & Environmental Protection (the other New England states with extant rattlesnake populations) to develop and implement a coordinated conservation effort for New England rattlesnake populations.

In regards to Massachusetts conservation efforts, the agency has an interest in establishing (or likely re-establishing) a population at a site that is no longer occupied, which provides an opportunity to create a founder population made up of individuals originating from multiple surviving Massachusetts populations. By combining individuals with a broader representation of the Massachusetts Timber Rattlesnake genetic diversity, the resulting population is expected to have improved genetic vigor. The decline of the Timber Rattlesnake, both in range and numbers, has been more severe than for any other species of reptile or amphibian in the state. While the Timber Rattlesnake is officially listed as an Endangered Species in Massachusetts and killing or disturbing one is a serious criminal offence, these acts are an ongoing problem, as is road mortality. Today, most of the surviving populations of Timber Rattlesnake are on state-owned protected open space, including DCR parks, State Forests, and State Wildlife Management Areas. Most of the areas where rattlesnakes are found have long been heavily used by the public, and the snakes have suffered for it.

Due to its remote location and islands that are off-limits to the public, MassWildlife proposed a plan to establish a population of headstarted animals on a large island at Quabbin ensuring there is one location where the human threat has been removed. The proposal was brought before the NHES Advisory Committee, the DCR at Quabbin, the Quabbin Watershed Advisory Committee and permission to move forward with the approval was approved by the Quabbin Superintendent. Information about the proposal was published in a local newspaper in December 2015 created a high level of interest by residents in the Quabbin area as well as by the media. In February 2016, MassWildlife hosted an informational meeting in Orange to which over 230 people were in attendance, 5 TV stations, 3 newspapers and New England Public Radio from Amherst. Following this event was continued citizen and media interest. A legislative oversight hearing was held in May in Athol by the Natural Resource Committee where the proposal was discussed with testimony by MassWildlife and Commissioner Peterson; the agency suggested a Working Group of legislators and citizens be set up for further discussion on the proposal. As of the end of the fiscal year, this committee had not yet been established.

Copperhead

MassWildlife partnered with MassDOT to remove invasive black swallowwort from an important den and basking area for copperheads in Hampden County.

Eastern Spadefoot

During July–September 2015, a plan to establish a population of Eastern Spadefoot at the Southwick WMA was begun and implemented. The plan calls for construction of at least three prospective breeding habitats and, when possible, repeated translocations of tadpoles through 2019, whereupon a second 5-year management plan would be developed and implemented. A total of three prospective breeding pools were constructed by the end of September 2015, and all three exhibited appropriate hydrology to support Eastern Spadefoot reproduction (Fowler's Toad bred in the pools with partial success during spring 2016, despite drought conditions). During February–June 2016, a 5-year, statewide monitoring plan for Eastern Spadefoot was developed and initiated. Heavy emphasis was placed on determining the statuses of local populations in the Connecticut River Valley ("Valley region") and identifying prospective donor populations in the region for tadpole translocations to the Southwick WMA. Emphasis was also placed on determining statuses of local populations elsewhere in the state where individuals had not been observed (reported) in ≥15 years. A group of volunteer monitors was convened and, by the end of June 2016, it was confirmed that three populations not observed since the mid-1990s are still extant. Important distributional updates for a population in the northern Valley region was also generated and surveys of several other populations were conducted. Unfortunately, survey data seemed to support a concern that two populations in the Springfield and East Longmeadow area might be extirpated, leaving the Valley region with only 2-3 remaining local populations. Two of those populations (one in Westfield, the other in Sunderland and Hadley) are now considered to be the most realistic options for providing tadpoles to the Southwick WMA. Spring 2016 marked the 3rd consecutive year of drought conditions in which no significant breeding of Eastern Spadefoot was detected anywhere in the state, although some limited breeding occurred on the Cape.

Marbled Salamander

During September–December 2015, 34 surveys (1 visual-encounter survey for adults, 25 dry-pool substrate searches for adults, 8 visual/dip-net surveys for larvae) were conducted at potential breeding wetlands to discover new breeding sites and/or update relatively old records. Surveys yielded observations of Marbled Salamander at 3 wetlands (2 via substrate searches, 1 via a visual survey for adults), result-

ing in discovery of 1 new population and 3 new breeding sites. Of note, courtship behavior was observed and captured on video at one of the wetlands, thus documenting a phenomenon seldom seen in Massachusetts. During May 2016, 11 dip-net and 4 visual surveys for larvae were conducted, documenting Marbled Salamander at 2 wetlands, including 1 new breeding site.

Jefferson Salamander / Blue-spotted Salamander Complex
Year 2 of a genetic and morphological investigation into the distribution of the Ambystoma jeffersonianum salamander complex in Massachusetts was implemented. During March–April 2016, 41 egg-mass surveys were conducted, documenting 3 new breeding sites and updating 5 existing records of the species complex. Between egg-mass surveys and trapping surveys, 1–74 tissue samples of Blue-spotted/Jefferson salamanders were collected from each of 14 sites distributed among southwestern, central, and southeastern regions of the state. One of the sites represents a newly discovered population and occurs in a potential contact zone between Jefferson Salamander and Blue-spotted Salamander (only two such zones are currently suspected in Massachusetts). A total of 413 tissue samples from 21 sites over the course of the study have now been collected; all samples were delivered to a laboratory in April 2016 for genetic analyses to be conducted during FY17. In addition to the aforementioned sites, an additional 6 sites in Bristol County were surveyed, leading to the discovery of a new population of Blue-spotted Salamander in Attleboro. Only a few individuals were observed, but the geographic location suggests the discovery marks one of only several known "pure" populations of Blue-spotted Salamander in Massachusetts, making the site a priority for future conservation work.

Tiger Beetles

Ghost Tiger Beetle (Cicindela lepida)

This species is historic in Massachusetts (no records in more than 25 years). Surveys were conducted at several potential sites in Chicopee and Ludlow. No new records were documented.

Boreal Long-lipped Tiger Beetle (Cicindela longilabris)

This species is historic in Massachusetts (no records in more than 25 years). Surveys were conducted at potential sites in Adams, Hawley, New Ashford, North Adams, and Williamstown. No new records were documented.

Moths and Butterflies

Coastal Heathland Cutworm (Abagrotis nefascia) and Dune Noctuid Moth (Sympistis riparia); Special Concern

In 2015, significant progress was made with an ongoing study, in collaboration with Paul Goldstein at the Smithsonian, of both the previously unknown life histories of these two species, as well as taxonomic issues with A. nefascia.
Hessel's Hairstreak Butterfly (Callophrys hesseli); Special Concern.

Surveys for this species were conducted at six historic (no records in more than 25 years) or near-historic sites in Douglas, Foxborough, Sharon, Walpole, Westborough, and Westwood/Dover. Initially both surprisingly and seemingly inexplicably, Hessel's Hairstreak was not re-documented at any of these sites. After the adult flight period (early May through early June), only a single Hessel's Hairstreak was reported statewide in 2015, despite the presence of more than 150 active butterfly watchers in the state. Like most insects, Hessel's Hairstreak populations undergo naturally large fluctuations in size from year to year. This, coupled with the canopy-dwelling habits of this species, make it is extremely difficult to observe Hessel's Hairstreak during a year when population sizes are small. Evidently, 2015 was such a year. Plans were made to resume surveys for this species in 2016.

Water-willow Stem Borer (Papaipema sulphurata); Threatened

Mark Mello of the Lloyd Center for the Environment was contracted to survey 50 historic (no records in more than 25 years) or near-historic sites for this species across southeastern Massachusetts, and was assisted by NHESP staff. In total, P. sulphurata was re-documented at 21 of the 50 historic or near-historic sites, as well as at four new sites. These results should not be interpreted as a decline of this species, as P. sulphurata populations are known to move amongst suitable habitats across the landscape, especially over a period as long as 25 years.

Pine Barrens Speranza (Speranza exonerata); Special Concern

A study of the previously unknown life history of this species, conducted in previous years, was published:
Nelson, M.W. 2015. The life history of Speranza exonerata Ferguson, 2008 (Geometridae: Ennominae: Macariini). Journal of the Lepidopterists' Society 69(2): 77-82.

Plants

Rare Plant Inventory

During the 2015 field season, 25 new plant element occurrence (EOs) records were created, up from 20 the year before. Of the existing plant records, 127 EOs were updated.

Considerable new data continue to be collected and submitted. This year saw 302 new such records accepted (double from the year before) with an additional eight leads. Fifteen submissions were rejected as inadequate or incorrect.

Special Projects

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

Sandplain Gerardia (Agalinis acuta); Federally Endangered: Population censuses or sampling procedures were conducted at eight sites; four locations on Martha's Vineyard and four on Cape Cod. The restoration population count at Frances Crane WMA was 8,545 plants, indicating appropriate management of the sandplain at this site. Population sizes of this annual plant at the four sites on Martha's Vineyard were 0, 15, 48, and 1,392. At the four sites on Cape Cod, the population sizes were 5, 125, 1,559, and 8,454.

Small Whorled Pogonia (Isotria medeoloides); Federally Threatened: Two new populations of this species were found and surveyed in a reservation in the town of Gloucester; an eastern cluster of 40 plants and a western cluster of 9 plants. Population censuses conducted at three of the (now) five known populations in 2015 showed a total of 144 plants, an increase of 35% from the previous year, including 34 plants bearing fruit (up 21% from previous year's count). Northeastern Bulrush (Scirpus ancistrochaetus); Federally Endangered: A survey of the population in Warwick, Franklin County was conducted resulting in 544 flowering stalks (ramets), an increase from approximately 300-400 in 2011 when the population was first discovered. One day of de novo survey work was also completed, but no new populations were found.

Seabeach Amaranth (Amaranthus pumilus); Federally Threatened: Seabeach Amaranth was found in Massachusetts in the 19th century on Nantucket and Martha's Vineyard, and possibly also in Plymouth County. A federal recovery plan was instituted in 1996, and then again in a Cooperative Recovery Initiative Proposal for FY15. Massachusetts is the likely location for a reintroduction effort on coastal national wildlife refuges, such as Monomoy NWR and Nantucket NWR. To prepare for this, MassWildlife and The Trustees of Reservations (TTOR) staff completed a full survey of Nantucket NWR and surrounding coastline owned by TTOR. This was completed to ensure no extant populations of seabeach amaranth were present before a reintroduction would occur, and to see if local genotype seed was available if extant populations were discovered.

General Habitat Management Projects

NHESP assisted with a variety of projects, including a prescribed fire at Francis Crane WMA, prepping Bird Island for the return of the federally endangered Roseate Tern, and rebuilding a deer exclosure in Sunderland to protect a state-endangered orchid.

The Program is also involved with a new initiative called the Sandplain Grassland Network, which involves research and restoration on this unique habitat that contains many rare and endemic species. The collaboration includes The Nature Conservancy, The Trustees of Reservations, The Marine Biological Lab in Woods Hole, various organizations on Nantucket including the Nantucket airport, and cooperators from the Kennebunk Plains in Maine and the Hempstead Plains on Long Island.

Invasive Plant Projects

Hardy Kiwi (Actinidia arguta) has been an aggressive invasive species in Lenox MA, causing significant damage to forest canopy and carpeting the forest floor, therefore preventing the growth of other plant species. The Program worked with staff from MassAudubon to control this species in areas of rare plant populations on the MassAudubon Pleasant Valley Sanctuary.

NHESP worked with the Massachusetts Invasive Plant Advisory Group (MIPAG) to list this new invader as a "likely invasive," which will now prohibit it from being sold commercially in the Commonwealth.

The Program continued to work in cooperation with DCR to control pale swallowwort within the habitats of state-threatened plant species at Mount Tom State Reservation. Treatment within a hickory-hop hornbeam woodland, an area known to be important habitat for Shining Wedgegrass (Sphenopholis nitida; T) and Lily-leaf Twayblade (Liparis liliifolia; T), has been particularly successful.

Mile-a-minute vine (Persicaria perfoliata) is a relatively new invasive plant in Massachusetts, first documented in 2006. The Massachusetts Invasive Plant Advisory Group has designated this invader as an early detection and rapid response species, making it a priority for management actions. NHESP, in cooperation with TTOR, DCR, The Department of Agricultural Resources, and USFWS's Silvio O. Conte National Wildlife Refuge, controlled populations of the plant for a sixth year in Erving, Bridgewater, Foxborough, and Greenfield.

Aquatic Species

Special Projects

MA DFW has been a partner on the removal of an old Mill Dam on the Nissitissit River in Pepperell, MA. Within the impoundment and downstream of the dam are populations of Brook Floater (Endangered), Creeper (Special Concern), and proposed Eastern Pearlshell and Triangle Floater [Species of Greatest Conservation Need in the State Wildlife Action Plan (SWAP)]. Twenty-five field days during FY16 were allocated to the assessment of habitat and abundances of these species at sites above, within and below the impoundment. Data collected will be used in assessing habitat usage of each species relative to habitat availability, and to determine if habitat changes after dam removal will likely benefit mussel populations. The dam removal took place in late September 2015, and greater than 200 mussels of 4 target species were translocated from the area of impact from the dam removal, 50% of which were state listed species. The translocation of rare mussels was used as an outreach opportunity to engage more than 25 volunteers in freshwater mussel conservation, totaling over 150 volunteer hours of work in translocation.

MassWildlife is continuing to collaborate with the USFWS and UMass Amherst on development of a freshwater mussel propagation program in Massachusetts. In FY16, the Program took the lead on a multi-state competitive State Wildlife Grant to assess monitoring techniques, propagation potential and conservation action for the MESA Endangered Brook Floater, and has assisted USFWS in achieving a Cooperative Recovery Initiative grant for assessment and propagation of federally endangered Dwarf Wedgemussel. Grow out and survival of Eastern Lampmussel from trials conducted in FY15 was low, however, facility updates at the Cronin Aquatic Resource Center (USFWS) in FY16 are promising, and results of additional trials will be reported for FY17.

In spring of 2015, a dam sluice gate broke on Bachelor Brook in Granby, MA, releasing impounded sediments into Bachelor Brook where state listed Brook Floater and Creeper occur. In July 2015, more than 20 Creeper (MESA Special Concern) were salvaged and taken to the Cronin Aquatic Resource Center (USFWS). The survival of salvaged animals after one year was greater than 90%, and updated surveys in FY17 will provide information on habitat suitability for replacement of salvaged individuals.

Regulatory Review

The following table summarizes the environmental reviews conducted during FY16:

Data Management and Data Products

In FY16, NHESP processed a total of 331 new rare species, natural community, and certified vernal pool records, and updated 807 existing records. The data processed were in the following categories:
Land Protection

In FY16, the DFW spent about $5 million to protect 1,910 acres of land across the state. Several of this year's acquisitions were of particular relevance to protection of rare species and exemplary natural communities, as noted below.

Northeast District:
Along the Nashua River in Dunstable, 57 acres were acquired, connecting two isolated parts of a WMA and conserving habitat for Brook Floater (Endangered), Blanding's Turtles (Threatened), Wood Turtle (Special Concern), Creeper (Special Concern), and two Special Concern dragonflies. In Townsend, the Division acquired another 100 acres of land with habitat for Blanding's Turtles.

Southeast District:
In Wareham, DFW acquired 165 acres south of Myles Standish State Forest, extending the permanent protection of the globally rare Pitch Pine/Scrub Oak natural community, which supports numerous MESA-listed species.

Central District:
In Hardwick, 108 acres were added to the Muddy Brook WMA, where ongoing habitat restoration efforts are bringing a large inland barrens landscape back to life.

Valley District:
Ninety-three acres were added to the Montague Plains WMA in Montague, with habitat for Eastern Box Turtle (Special Concern) and Eastern Whip-poor-will (Special Concern).

Western District:
In Hancock, protection of a BioMap2 Forest Core along the New York/Massachusetts border was extended with the acquisition of 92 acres.

Review Type	**Count**
Conservation & Management Permits – Application Received	24
Data Releases	67
MESA Information Requests	215
Forest Cutting Plans	99
MESA Project Reviews	776
MEPA Reviews	62
Notices of Intent	601
Scientific Collection Permits	98
Other	113
Total	**2055**

Natural Heritage and Endangered Species Program Advisory Committee:
Full members are: Kathleen Anderson (Chair), Mark Mello (Vice Chair), Thomas Rawinski (Secretary), Gwilym Jones, Joseph Larson, Wayne Petersen, and Jennifer Ryan.

FY16 Totals	New Records	Updates to Existing Records
Vertebrates	75	554
Invertebrates	34	92
Plants	25	127
Communities	65	13
CVPs	132	21
Total	**331**	**807**

Associate members are: William Brumback, Andy Finton, Timothy Flanagan, Mark Pokras, Kevin Powers, Karen Searcy, Dave Small, and Bryan Windmiller.

Presentations from Agency Staff

Piping Plover On-line Data Entry System (PIPLODES) Overview (Amanda Veinotte, NHESP Administrative Coordinator)
Massachusetts State Wildlife Action Plan (Lynn Harper, NHESP Habitat Protection Specialist)

Update on the Massachusetts Fire Management Program (Tim Simmons, NHESP Restoration Ecologist)

The Massachusetts Wildlife Climate Action Tool (Jonathan Brooks, DFW Wildlife Population Ecologist)

Freshwater Mussels and the Nissitissit River Restoration (Peter Hazelton, NHESP Aquatic Ecologist)

Listing Process for Rare Species (Mike Nelson, NHESP Invertebrate Zoologist)

Mass Biodiversity Protectedness Analysis: How well protected are our biodiversity resources? (Lynn Harper, NHESP Habitat Protection Specialist)

Update on Revising the Classification of Natural Communities of Massachusetts (Pat Swain, NHESP Natural Community Ecologist)

Presentations from Others

Statewide Fish and Wildlife Connectivity Priorities: UMass Critical Linkages (Andy Finton, The Nature Conservancy)
Common Loon Recolonization Efforts in Southeastern Massachusetts (Vincent Spagnuolo, Center for Loon Conservation)

Age-related Difference in Foraging Areas and Movements of Great Shearwaters (Puffinus gravis) in the Gulf of Maine and its Surrounding Waters (Kevin Powers, NHESP Advisory Committee)

MassWildlife and MassDOT personnel collect, identify and relocate freshwater mussels at a bridge construction site on the Millers River in Orange.

Natural Heritage and Endangered Species Program Staff

Thomas W. French, Ph.D., Assistant Director
Tara Boswell, GIS Manager
Chris Buelow, Assistant Restoration Ecologist
Karen Dolan, Finance and Projects Administrator
Karro Frost, Conservation Planning Botanist
Lauren Glorioso, Endangered Species Review Biologist
Sarah Haggerty, Chief of Information and Program Development
Lynn Harper, Habitat Protection Specialist
Peter Hazelton, Ph.D., Aquatic Ecologist
Amy Hoenig, Endangered Species Review Biologist
Emily Holt, Endangered Species Review Assistant
Tara Huguenin, Conservation Data Specialist
Mike Jones, Ph.D., State Herpetologist (part year)
Kim Justham, Conservation Data Specialist
Jacob Kubel, Conservation Scientist
Jesse Leddick, Endangered Species Review Biologist
Jennifer Longsdorf, Administrative Assistant
Lisa MacGillivray, Habitat Mapping Biologist/Data Specialist
Sarah Maier, Natural Heritage Database Manager
Misty-Anne Marold, Senior Endangered Species Review Biologist
Carolyn Mostello, Coastal Waterbird Biologist
Michael Nelson, Invertebrate Zoologist
David Paulson, Endangered Species Review Biologist
Brent Powers, NRCS Review Biologist
Jonathan Regosin, Ph.D., Chief of Conservation Science
Eve Schlüter, Ph.D., Senior Endangered Species Review Biologist
Tim Simmons, Restoration Ecologist
Patricia Swain, Ph.D., Natural Community Ecologist
Amanda Veinotte, Administrative Coordinator
Bob Wernerehl, Ph.D., State Botanist

Information & Education

Marion E. Larson
Chief, Information and Education

Overview

The Information and Education (I&E) Section has the responsibility and challenge of keeping sportsmen, conservation groups, municipal officials, environmental consultants, naturalists and other constituents apprised of regulations, laws, and recreational opportunities related to wildlife. It also provides basic information about and science-based explanations of wildlife-related issues, in order to enhance public understanding of wildlife management and compliance with laws and regulations. The Section also maintains an active program of educational and promotional outreach, to instill and foster an appreciation for fish and wildlife and related recreation in the general public.
Personnel

Sue Fritze, Clerk in the front office retired in October of 2015. Beyond her duties at the front desk, Sue was very helpful with the Becoming an Outdoorswoman Program.
Peter Mirick, biologist and editor of Massachusetts Wildlife magazine of over 32 years of service retired in February of 2016. His Guide to Amphibians and Reptiles is close to completion. Sadly, he was diagnosed with a rare form of cancer just a month before retirement. Staff have been supportive and in contact with Pete as he faces this battle. A new magazine editor and publications manager Troy Gipps was hired in May.

Library/Archives

The book "The Massachusetts Division of Fisheries and Wildlife: 1866-2012" was published in June 2015, with 103 hard copies and 100 compact discs printed. Copies were distributed to reviewers and cooperators, MassWildlife installations, the Board, the Natural Heritage & Endangered Species Advisory Committee, the State Library, and a few other libraries and agencies. Jim Cardoza as part of his contract has since updated the text of the book through calendar 2015 in commemoration of DFW's 150th anniversary. Entry of books, journals and theses into an electronic database for the library was completed and the system went on-line for the staff in October of 2015. An electronic catalog for the archives was created, building upon the basic format used for the library. Archival materials also include artifacts, i.e., hard items other than documents or books. Entry of archival items began in November 2105 and as of July 1, 2016, there were about 990 items entered. In spring of 2016, Information and Education staff and myself retrieved the collections of the former DFW Museum, which had been stored at the State Archives at Columbia Point in Boston. The Secretary of State's office had requested this action since they are renovating their building and needed the space. Almost all the materials and items retrieved have been entered, catalogued, bar-coded and matched against the original MassWildlife museum catalog. It appears that there are still 4-5 boxes which were misplaced and have not yet been retrieved from the State Archives. Other archival material has been scattered in various places in the Field Headquarters (as well as other facilities) and at the Acton storage building. Cardoza has processed many of these objects and artifacts. Archival objects are now stored mostly at the Acton facility, although a few have been retained at Westborough. Several of the archival objects were used in displays at the Field Headquarters during the 1-day 150th Anniversary celebration in June.

Re-Branding MassWildlife

In FY 16, the Division underwent a re-branding process. The purpose of this effort was to establish a consistent look and feel for the agency across all publications, communications, websites, and products. This initiative was led by the Marketing and Outreach Specialist, Nicole McSweeney. By implementing a new brand, the agency sought to increase public awareness and recognition of MassWildlife and its activities. MassWildlife contracted with Shields Design, a Massachusetts-based graphic design firm, to make recommendations and develop designs. At the April 2016 meeting, the Fisheries and Wildlife Board approved changes to the Division of Fisheries and Wildlife seal and supporting elements. Another major change is using "MassWildlife" as the official nickname for the agency, rather than "DFW" or other acronyms. Information and Education staff then began implementation of the rebranding, which included updating handouts, presentations, fliers, pamphlets, clothing, and using the new templates.

Updating the Division Logo: Left—Old Logo Right—New Logo

Communications
Emily Stolarski, Communications Specialist

Website

Some major work was completed during FY16 – some related to new MassWildlife programs or initiatives, other work was sparked by the desire to improve the user experience and give the public better access to information. We anticipate an initial statewide effort to re-organize agency websites, beginning some time in FY2017.

What follows is a list of major projects from the past fiscal year.

- A new trout stocking report, allowing anglers to use a sortable list or a map, was posted online at Mass.gov/trout. The report is now updated daily to positive reviews by users.
- A section on mountain lions in Massachusetts was posted online using content from a recent Massachusetts Wildlife magazine article. Posting on the web allowed a more thorough visual explanation of the "hoaxes and misidentification" section. It quickly became a high traffic set of pages.
- A fishes of Massachusetts guide was developed and included illustrations and descriptions of all Massachusetts fish species. Information on MA state records and endangered species status was included.
- Production began on Wildlife Management Area write-ups and Pond Map write-ups. Once posted, these WMA write-ups will be available to the public through the Wildlife Lands Viewer. The Pond Map write-ups will accompany new bathymetric maps – an already very poplar product on the website. I & E, Fisheries, Wildlife and District staff are collaborating on this effort.
- Other significant new postings: Youth Deer Hunt Day, 2015 State Wildlife Action Plan and supporting documents, A History of MassWildlife: 1866-2012.
- Recommendations for text updates and minor reorganization within the MassFishHunt licensing system were also submitted to Active Outdoors. Text was developed in cooperation with the Hunter Education Program and was tailored to new hunters.
- Working with MassWildlife's R3 Coordinator and Outreach and Marketing Coordinator, work was done to redesign hunting-related pages with the new hunter in mind.

MassWildlife E-newsletter and Advisories

Nicole McSweeney, Outreach and Marketing Coordinator, and Communications Coordinator Emily Stolarski collaborate to publish the monthly e-newsletter "MassWildlife Monthly." 12 issues of the electronic newsletter were published this fiscal year around the first of the month and emailed to nearly 16,000 subscribers. The newsletter is sent using Constant Contact, an email marketing service. On average, 40% of subscribers open the MassWildlife Monthly email, which is considered an "above industry average" open rate, compared to other businesses and organizations using Constant Contact (18%). Advisories alerting subscribers and license holders of new regulations, special events, public meetings and hearings, etc., were also sent out through Constant Contact.

Media Communications
Marion Larson, Information & Education Chief
Emily Stolarski, Communications Specialist

As per current protocol, media inquiries are routed through the Executive Office of Energy and Environmental Affairs (EEA) press office. Media inquiries are then passed on to MassWildlife staff for a response. Sometimes, EEA provided the information directly (or with assistance from MassWildlife) to the media, or the inquiry is handled through the Department of Fish and Game (DFG).

New media members contacting the agency are signed up on the MassWildlife Monthly e- newsletter list. The major newspapers, outdoor and environmental writers from across the state are included in this list.

The I & E Chief was the main media contact for the agency. Media interest in both the Blue Hills Deer Hunt and MassWildlife's Rattlesnake Restoration project occupied a significant amount of time between arranging interviews with staff members, coordinating media logistics at events relating to these programs. Other events requiring some media logistics included the Special Events listed elsewhere in this report.

In FY 16, we documented at least 375 media inquiries from 143 unique media outlets, (FY 15 had 118 media inquiries from 61 different media outlets). The higher number is most likely due to more consistent End of Day reports from the EEA Press Office as well as a growth in the media listing on the MassWildlife E-newsletter list. More media outlets appear to be following MassWildlife's Facebook page, resulting in an increase in media inquiries, image requests and subsequent stories.

The vast majority of inquiries (211) come from 77 newspapers; 92 inquiries came from 17 television channels; 40 inquiries from 16 radio stations; 22 inquiries from 16 magazines; 10 inquiries from 14 online media outlets. The most popular media inquiry topic (25 inquiries) was the agency's proposal to headstart rattlesnakes and release them on an island at Quabbin Reservoir. Coverage of this topic ranged across the country as well as within the state. 22 Inquiries regarding bears, 20 regarding the DCR Blue Hills Reservation Hunt, 23 relating to deer, 18 coyote related inquries, 18 relating to eagles, 14 relating to moose.

As in past years, DFW utilized a newspaper-clipping service to collect all articles in Massachusetts newspapers that mention the Division by name. Articles mentioning DFW totaled 2,743 (1,442 in FY 15) with an average of 228 (120 in FY 15) articles per month.

A number of Massachusetts groups and organizations re-distributed through their networks MassWildlife Monthly newsletter pieces and Facebook postings. Ranging from the DEP Western Region Circuit Rider, Mass Land Trust Coalition, Athol Bird and Nature Club, Worcester County League of Sportsmen, Plymouth County League of Sportsmen, Berkshire Environmental Action Team. These groups distributed information provided by MassWildlife's I&E Section through electronic and paper newsletters and other member updates.

The Chief is the agency's main media contact and many inquiries are handled by her or she will pass it on to an appropriate staff member at the Field Headquarters or District office. With the intense media interest in both the Rattlesnake Restoration Project and the Blue Hills Deer Hunt, a significant amount of time by the the I & E Chief was spent arranging interviews, making staff available at various venues relating to these topics. Other events requiring media outreach included the Fran Sargent Award, 150th Anniversary, the Turner Dam Removal event, the Hatchery Pipeline event, Trout Stocking at Jamaica Pond and Earth Week Trout Stocking events.

Outreach and Marketing
Nicole McSweeney, Outreach and Marketing Specialist

Public Engagement

Agency Email

A total of 2,780 agency email messages (2,660 FY 14) were managed by Biologist Bridgett McAlice, who is assigned to the Wildlife Section. The highest traffic month was February, with a monthly total of 506 emails. This was due mostly to public interest and comment regarding the Rattlesnake Project.

Social Media

In FY 16, MassWildlife continued utilizing its Facebook page (facebook.com/masswildlife) to engage with its constituents. By the end of FY 16, the MassWildlife Facebook page gained over 12,500 followers (up from 5,700 in FY 15). 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; promote agency events, programs, job openings, and donation opportunities; listen to what constituents are saying; and engage with the public by responding to their comments and questions. Field Headquarters TV Display.

The Outreach and Marketing Coordinator continues to

manage and publish content for the TV monitor in the lobby area of the MassWildlife Field Headquarters building. The Field HQ building has become a popular site for meetings of various state agencies and organizations, with several thousand people visiting the building who may not have otherwise had any connection or engagement with MassWildlife. Visitors enjoy seeing wildlife photos and videos, as well as field work photos and videos when they enter the building.

Fairs and Trade Shows

The District offices and the Hatcheries that are open to the public have traditionally offered the agency's most frequent opportunities for face-to-face interactions with members of the public, so support is given to these installations every year, through publications and staff time. Agency presence at regional and county fairs (late summer-early fall) and sportsmen's shows (late winter-early spring) has traditionally been provided by the Wildlife District within which the event occurs (with limited assistance from staff at the Field Headquarters), but competing demands and limitations on staff time often hamper an individual district's ability to install and staff a display to provide visitors with opportunities to ask questions and make connections to the agency. The Field Headquarters I&E staff provided support to the Wildlife Districts by coordinating the displays, filling in schedule gaps, restocking literature, answering or referring questions, and generally giving event visitors more opportunities to be exposed to the mission and work of the agency.

In FY 16, MassWildlife exhibited at 3 fairs: the Marshfield, Franklin County (Greenfield), and Topsfield fairs; and four trade shows: the New England Fishing and Outdoor Expo (Acton), the Springfield Sportsmen's Show (West Springfield), the Boston Local Food Festival, and the Boston Flower Show. Field Headquarters I&E staff and other Division staff, including Wildlife District staff, continued the tradition of selling licenses at the two sportsmen's shows; staff also answered sportsmen's hunting- and fishing-related questions. The Boston Flower Show was again and by far the largest of MassWildlife's exhibiting opportunities in this fiscal year, giving agency staff and its "Living With Wildlife" series of handouts very favorable exposure to tens of thousands of mostly urban visitors at the center of the state's most popular flower show. The FY 16 Boston Flower Show display was enhanced by an extensive collection of the agency's pelts from most of the state's native furbearers, which were displayed on tables so that visitors could touch, handle, compare, and ask questions about them. Somewhat unexpectedly, this multi-aged, largely urban and suburban audience was as interested in hunting, fishing, and wildlife-viewing as it was in managing damage from or concern about wildlife in its yards, gardens, and neighborhoods, based on the types of questions asked and the types and numbers of publications taken.

Promotion and Outreach Events

Staff from across the agency lead and otherwise participated in public events as workloads and time permit. In FY 16, MassWildlife staff participated in 82 public events including informational talks to towns, conservation groups, sportsmen's clubs, and schools; habitat site walks; conferences and public meetings. MassWildlife staff also took part in 45 non-public events such as committee meetings, university guest lectures, and inter-agency planning groups. I&E staff consulted with Division staff involved in outreach events, provided display equipment and literature for specific audiences, developed targeted display materials such as posters and handouts, and/or helped to staff the agency's display at these events.

Examples of FY 16 outreach events include: Habitat Site Walks on WMAs in Falmouth, Southwick, Montague, and Plymouth; Western Mass Woodlands for Wildlife, Peru; Westfield River Symposium; MACC Annual Environmental Conference, Worcester; Groton Conservation Summit; Environmental Literacy Plan Working Session, Westborough; along with numerous programs related to fish and wildlife conservation and management and MassWildlife programs.

150th Anniversary

MassWildlife celebrated its 150th anniversary with a variety of events and publicity

Building Preparation

"Celebrating 150 Years of Conservation" banners. Banners were designed and printed for FHQ, district offices, and hatchery facilities.

Historical shelving display

Two exhibits were designed for the shelving units in the FHQ atrium. The themes were "MassWildlife staff activities through the years" and "Fishing, hunting, and trapping through time." Historic photographs were scanned, printed, and framed; other artifacts were gathered and displayed as well.

Wildlife photography

Working closely with MassWildlife Photographer Bill Byrne, photos were selected for each first-floor conference room and the atrium. Byrne spent time adjusting and enhancing the digital files. MassWildlife then contracted with Gastonart & Frame, Inc. to print and mount large photographs

onto a wood composite backing with gallery. Gastonart then installed finished art in the building.

Trout pond interpretive sign

The concept and text for the two trout pond signs were developed with input from the Fisheries staff.

Massachusetts Wildlife Magazine Anniversary Issue

A commemorative issue of Massachusetts Wildlife magazine including articles from long retired staff members Ted Williams (former magazine editor) and conservation helper Joe Nava now in Alaska were published. The magazine itself marked its 60th anniversary in 2016.

Speaker Series "Conservation Connections"

All talks were free and open to the public. An estimated 275 people attended these talks and walks.

- Wildlife Journey in Time: The History of Wildlife in Massachusetts. (February – Marion Larson, Chief, Information and Education, MassWildlife)
- Amphibian & Vernal Pool Conservation Needs You (March – Jacob Kubel, MassWildlife Conservation Scientist and Matthew Burne of the Vernal Pool Association)
- Linking Landscapes for Massachusetts Wildlife: Citizen Science and Road Ecology can Benefit Wildlife and Motorists (April – David Paulson, MassWildlife and Tim Dexter, DOT)
- Bird Conservation at MassWildlife (May – Andrew Vitz, MassWildlife's State Ornithologist)
- Birding Walk, Bolton Flats WMA (May – Andrew Vitz, MassWildlife's State Ornithologist)
- American Chestnut Restoration in Massachusetts (June – Lois Breault-Melican, American Chestnut Foundation)
- Into the Night: Exploring Moths and Other Nocturnal Insects (July – Michael Nelson, Invertebrate Zoologist, MassWildlife)
- Prescribed Fire: Maintaining and Restoring Wildlife Habitat throughout MA. (August – Tim Simmons and Caren Caljouw, MassWildlife)
- Sandwich Fish Hatchery Tour (September)
- MassWildlife Hatchery History (September – Ken Simmons, MassWildlife's Chief of Hatcheries)
- MassWildlife's 150th Anniversary Open House – June 4, 2016

To celebrate the milestone, MassWildlife held an open house to showcase its many programs and accomplishments. Special invitations were sent to state representatives and officials, the Fisheries and Wildlife Board, and MassWildlife retirees. Open house announcements were also posted in the MassWildlife Monthly newsletter, in the Worcester Arts Calendar, Worcester Telegram & Gazette, and various family calendars. Free lunch and a "birthday" cake and birthday cupcakes were provided to all guests by the Massachusetts Outdoor Heritage Foundation. An estimated 1,000 people attended the event on a clear and hot day. About 50 MassWildlife staff worked at the event.

Activities and Exhibits Included:

- Scavenger Hunt
- Insects, Mussels, & Plants
- Wildlife Pelt Preparation
- Hunter Education Shooting Simulation
- Amphibians and Reptiles
- Mammals and More
- Habitat and Wildlife Lands Programs
- Fish
- Birds of MA
- Kids Crafts
- Archery
- Learn to Cast
- Minke Whale Skeleton
- MassWildlife Fleet Vehicles and Vessels

OTHER SPECIAL EVENTS

In addition to the 150th Anniversary event in June, MassWildlife hosted several other notable events in FY 16. The I & E Section staff coordinate publicity, and on-the-ground logistics for the agency.

Francis Sargent Conservation Award to the Berkshire Natural Resources Council – September

This was the first year that the prestigious Sargent Award was given to a group. MassWildlife celebrated the exceptional partnership with BNRC and acknowledge the group's long history of protecting open spaces.

Millie Turner Dam Removal Event, Pepperell – October

The dam removal on the Nissitissit River was carried out with support of a diverse group of partners, of which MassWildlife was a critical member. A media event was held to celebrate this project.

MassWildlife's Habitat Conference: Protecting our Investment in Wildlife Diversity – October

MassWildlife organized this daylong conference at the FHQ to outline a vision for habitat management in Massachusetts

and to unveil the new MassWildlife Habitat Management Grant Program. The conference brought together a diverse group of partners to discuss strategies and tools to create and maintain habitat for wildlife. A new Habitat Management Grant Program was announced at this event by Matt Beaton, Secretary of Energy and Environmental Affairs.

Groundbreaking for McLaughlin Fish Hatchery Pipeline, Belchertown – June 2016 (Joint with MWRA)

A media event was held to celebrate construction of a water pipeline and hydropower turbine that will supply 6 million gallons of gravity-fed water daily to the hatchery. Governor Charlie Baker, Environmental Affairs Secretary Matt Beaton and officials from the MA Water Resource Authority, Department of Conservation & Recreation, Department of Fish and Game and other conservation and fishing groups joined MassWildlife at this event.

Massachusetts Outdoor Exposition
Gary Zima, Senior Planner

On September 20, 2015 the Division of Fisheries & Wildlife was a major partner at the 19th Annual Massachusetts Outdoor Exposition (also known as the Big MOE) with FAWNS (Facts About Wildlife & Nature Society) the host non-profit conservation organization. This 1-day, family-oriented event is traditionally held on or around National Hunting and Fishing Day, in the last weekend in September, on the Hamilton Rod and Gun Club grounds in Sturbridge. This year, approximately 4,000 individuals were in attendance, coming from across the state as well as Rhode Island, Connecticut, and New Hampshire. There were over 45 different activity stations, with the majority being staffed by various fish-and-game-club volunteers and other professional organizations such as the National Wild Turkey Federation, Capen Hill Nature Sanctuary, and the Massachusetts 4-H Program.

This free event is designed to introduce children and adults to a variety of traditional outdoor activities relating to hunting, fishing, trapping, water sports, nature observation, and shooting sports, with one-on-one and mentored instruction available and without the necessity for purchasing any equipment. Demonstrations and exhibits on forestry, wildlife management, pioneer encampments, sporting dogs, and tree-stand safety are also part of the event. Most of the activity and demonstration stations are staffed by local sporting, conservation, and other outdoor-related clubs and businesses.

Coordinated by volunteers with FAWNS, this popular event attracts thousands of participants – individuals, youth groups, and families – every year. The Division has been actively involved in this event for over 13 years with a few DFW staff serving on the event committee as volunteers, including a number of agency staff volunteering at the event. I&E Specialist Zima is a key organizer of the Big MOE and some of his job responsibilities include his activities associated with the Big MOE. As the event organizer, he coordinates and chairs monthly planning meetings, maintains a database of approximately 320 Big MOE volunteers, and writes the necessary grants that offset the operational expenses associated with the event.

Publications

Massachusetts Wildlife Magazine

The DFW's most visible publication is Massachusetts Wildlife, a 40-page, full-color, quarterly magazine with a currently growing base of approximately 20,000 subscribers and a standard publication printing of 25,000 copies that provides surplus for handouts and promotions at programs, shows, and fairs. Publications Editor and Wildlife Biologist Peter Mirick, Graphics Artist Dave Gabriel and Senior Photographer Bill Byrne, I & E Chief Marion Larson , newly hired Editor Troy Gipps along with other I&E staff, produced four issues of Massachusetts Wildlife (Number 3, 2015 – Number 2, 2016) covering a wide variety of 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 particular subjects for many years to come, this year's offerings included Issue #3 2015 featured articles on our coastal Seaducks, with a focus on Harlequins and Longtail Ducks, written by Waterfowl Biologist H Heusmann; articles on Falconry and an update on our Nesting Sandhill Cranes, documenting the second nesting pair in the Berkshires, written by State Ornithologist Andrew Vitz.

#4 2015 featured detailed articles on Snowy Owl research in MA; the amazing progress of American Chestnut Foundation partners, with progress in developing a blight resistant strain for the future; and an artful display of work detailed by a master decoy carver.

#1 2016 issue was the "transition" issue as Peter Mirick retired before the issue was published. This issue featured a look back into the career of one of our own wildlife biologists, the late Richard Burrell; also 2 articles about amazing moose battles in MA; and a "revealing" article about moth & butterfly larvae camouflage, written by staff Invertebrate Zoologist Michael Nelson.

#2 2016 marked the first issue published for newly hired Troy Gipps who started with the agency in May. Much work had

been done in advance with Bill Byrne and Marion Larson. This issue featured MassWildlife's 150th celebration and look back on the 60 years of Massachusetts Wildlife magazine history, and included a major article about the History of Wood Ducks in MA, written by H Heusmann. Other articles reminiscing about the past from Ted Williams and wood duck design and installation from Joe Nava, former Wildlife Conservation Helper in the 1950's lent a historic flair.

Magazine Subscription Efforts

The beginning of the fiscal year July 1, 2015 showed 20,646 subscribers for the magazine. By June 30, 2016 there were 20,142 magazine subscribers.

Surplus magazine issues are made available for free at sporting shows, fairs, meetings and other public events in which the agency participates.

During FY 2016, four efforts at renewal mailings were sent out totaling 8,735 reached. Total cost of these mailings was $3,118 resulting in revenue of $19,529 from 2,039 renewals. Cash acknowledgements ("thank you's" with an early renewal offer) are routinely sent out to all paid orders. 5,832 were sent out at a cost of $2,023. These included cash acknowledgements from a nominee promotion in the prior fiscal year (May 2015). Revenue from 1,655 orders was $11,588. There was no direct mail solicitation for new subscribers during this fiscal year. A gift subscription renewal effort resulted in a mailing to 8,510 subscribers who have given gifts at a cost of $3,038 resulting in revenue of $25,422. Another mailing at a cost of $2,054 went out to 5,753 subscribers who had not given gift subscriptions in the past with a revenue result of $2,124.

The Guide to Hunting, Freshwater Fishing, and Trapping

The 2016 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, 60-page booklet includes a digest presentation of the fishing- and hunting-related laws and regulations and articles of interest to sportsmen; in FY 16, these included articles on tree stand safety, becoming a hunting mentor, the Division's 150th Anniversary and wildlife land acquisition. Communications Coordinator Emily Stolarski and Senior Photographer Bill Byrne contributed much of their respective time to the production of the 2016 Guide, providing articles, photos, and editorial support to the publisher and other staff involved with this critical project. Approximately 205,000 copies were printed, representing a 5% drop in copies due to left overs at the end of the year. An electronic website of the Guide has been provided by the publisher as part of the contract and this site has been visited often.

Field Guide to Amphibians and Reptiles

Due to the popularity of two special Massachusetts Wildlife magazine issues, Field Guide to Massachusetts Reptiles and Field Guide to Massachusetts Amphibians, it was decided that the agency would create a combined field guide. Features including a spiral binding and UV protective coating will provide allow for greater usability in the outdoors. Massachusetts' four species of sea turtle will also be included in the new field guide. Magazine Editor, Peter Mirick, completed the most of the work on the new book with assistance from MassWildlife Photographer Bill Byrne. After Mirick's retirement in February 2016, the Communications Coordinator took over layout responsibilities. Though most of the work was done on the book in FY 16, it was finalized and printed in FY 17.

Standard annual publications, including the trout-stocking lists and the waterfowl abstracts, were updated and reprinted.

Photography
Bill Byrne, Senior Photographer

Two primary photographic goals were achieved in FY 16, that of providing suitable images for the 2016 Guide summary of fishing , hunting and trapping regulations, and on a much larger scale, providing processed images for the publication of four issues of Massachusetts Wildlife magazine . For each issue there is a variety of image sources, some by contributing authors, some by MassWildlife staff with special projects, and many by photographer Byrne. All images must be digitally processed to conform to high standards of color contrast, sharpness and dimensions to help insure the best reproduction. Then there are multiple rounds of color proofs and a final press check at the printing vendor to insure the best quality issue goes to our readers.

Four issues of Massachusetts Wildlife magazine were published. Many articles required extensive field work, or working with submitted photos from authors. All images required careful preparations for publishing. Each issue then required multiple rounds of color proofing, followed by attending the first press run.

FY 16 was particularly challenging for the Senior Photographer and so many staff as MassWildlife was preparing for the 150th celebration and Open House at the new Field Headquarters building in June of 2016. My main duty was to collect and prepare images that could be displayed in a large format in the first floor open space and adjoining meeting rooms. Creating a poster image is one thing, but

preparing 24 images that would be 30”x20” up to 40”x60”, and then monitoring final production became a major priority in the winter/spring of 2016. The wall hangings should last for many years and attract a lot of interest.

Throughout FY 16 there were many ongoing events that were photographed: SportFishing awards, Junior Duck Stamp competition awards, Conservation Camp awards, the Big MOE in Sturbridge, and the Sargent Award.

Requests for images by staff for publications, presentations and species accounts were fulfilled not only by the Senior Photographer, other I & E staff (I & E Chief, Outreach Coordinator, Communications Coordinator and I & E Specialist) have also made themselves familiar with the files to utilize photos for the agency social media and newsletter needs, program needs and media inquiries. Fullfilling these requests has been made more efficient and eased the burden on the Senior Photographer considerably.

I & E staff as well as other agency staff also provided images both still and video footage documenting agency activities which were put to use on the agency Facebook page and for use in staff presentations.

General Wildlife Education Programs

Staff members in the I&E Section offer programs to civic, school, community, conservation, and sportsmen’s groups on a variety of wildlife-related topics throughout the year, for both youth and adult audiences. Through our wildlife education programs (general wildlife, wildlife in the backyard, wildlife in the schoolyard, endangered species, tracking, living with wildlife, wildlife and habitats), public appearances at conferences, and workshops, we reach out to urban youth, scouts, early childhood educators and administrators, Department of Youth Services secure-treatment residents, pre-service teachers, undergraduate and graduate college students, formal and non-formal educators, and other adult audiences. In FY16, general wildlife education programs were attended by 674 people.

Formal School-based Education Programs
Pam Landry, Education Coordinator

Educational programs by Education Coordinator Pam Landry focus on groups of educators, students, and youth gatherings, but were also highlighted at other public events.
Project WILD and Aquatic WILD

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. It is based on the premise that young people and educators have a vital interest in learning about our natural world. 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. Through the use of balanced curriculum materials and professional training workshops, Project WILD accomplishes its goal of developing awareness, knowledge, skills, and commitment. This results in the making of informed decisions, responsible behavior, and constructive action concerning wildlife and the environment.

Growing Up WILD: Exploring Nature with Young Children

This early-childhood (ages 3-7 years) education program 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 is a tool for helping fish and wildlife agencies meet their conservation goals by recognizing that children start developing attitudes towards wildlife and nature at an early age, providing knowledge and skills to early childhood educators so they may teach about nature, providing suggestions for outdoor nature-based recreation, providing conservation suggestions for each activity, providing activities that families can do together, and laying the foundation for acquiring increased scientific knowledge and problem-solving skills. There was a continued strong focus on connecting Growing Up WILD to Science, Technology, Engineering, & Math (STEM).

Twenty-three Project WILD & Growing Up WILD facilitators, contributing 663 volunteer hours, offered 22 workshops that reached a total of 385 pre-K-Grade 12 educators from across the Commonwealth. A multiplier effect on the outreach to students from 385 educators train in WILD programs calculates 75 students reached/year/educator—resulting in a student exposure to WILD activities of 28,875 youth. This formula is derived from the National Project WILD program. Workshop participants included undergraduate and graduate college students, formal and non-formal educators, nature center natural history guides, state park interpreters, homeschooling parents, librarians, Montessori teachers, Student Conservation Alliance volunteers, scout leaders, and summer camp staff.

Early-childhood educators attending workshops represented staff from: family child care and child care centers, Massachusetts Association for the Education of Young Children, Head Start and Early Head Start, Department of Early Education and Care, Montessori schools, YMCAs, state and community colleges, Self-Help/Community Partnership for Children, the AmeriCorps Student Conservation Alliance, children and science museums, and child care resource and referral agencies.

Flying WILD Workshop

Flying WILD offers a whole-school approach to environmental education using birds as the focus. Targeted for the middle-school audience, though widely adaptable, Flying WILD offers practical hands-on classroom and outdoor field investigation experiences connecting real-world experiences in bird biology, conservation, and natural history. A Flying WILD workshop was not offered during this fiscal year
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 include: landscape investigation, schoolyard biodiversity, field investigation, fostering outdoor observation skills, applying systems thinking, and much more. Material was distributed to educators when applicable or they could download resources at www.fishwildlife.org (focus area, conservation education).

Informal Public Education Programs

Through a variety of education programs (general wildlife, wildlife in your back yard, endangered species, tracking, living with wildlife, wildlife in your schoolyard, wildlife and habitats), public appearances at conferences, special events, and workshops, the Education Coordinator and many other Division staff reached out to people from across the Commonwealth: from students, teachers and schools, scouts, libraries, formal and non-formal educators, natural resource managers, land trusts, conservation commissions, civic and municipal boards and groups, and a variety of other audiences.

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

Students in grades K-12 from across the Commonwealth submitted 454 pieces of artwork to this "Conservation through the Arts" program. Entries were received from public, private, and home schooled students; scouts; individuals; and private art studios. The judging, by a panel of five professional wildlife artists, took place at the Division of Fisheries & Wildlife Field Headquarters, Westboro. The colored pencil drawing of a Canada goose by Carol Liu, Shi Lin Art Studio was selected as Best of Show and represented Massachusetts at the National Competition. Nearly 200 people (student artists, families, judges, supporters and teachers) attended the awards ceremony held at Worcester Technical High School. Combinations of the top 100 pieces of art were part of a statewide traveling exhibit appearing at ten venues. Curriculum for students, educators, home school, and non-formal groups designed to spark youth interest in habitat conservation through science, art, math and technology was made available to student artists & educators upon request.

Several waterfowl mounts were donated by Scott Spry, MA Chapter of Ducks Unlimited and in memory of Dick Burrell, former MassWildlife biologist in the Wildlife section.

In Massachusetts, the Junior Duck Stamp Program is sponsored by DFW and U.S. Fish and Wildlife Service, with support from the Massachusetts Chapter of Ducks Unlimited and Massachusetts Wildlife Federation.

Massachusetts Envirothon

The 2016 Envirothon was held in May at Hopkinton State Park, Hopkinton with approximately 35-40 school teams participating.

MassWildlife's continued involvement in this natural resource program, which reaches over 500 urban and rural high school students representing over 50 communities annually, continues through the efforts of Wildlife Education Specialist Pam Landry, who 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 (Managing Invasive Species), and attends the competition. Several other Division staff played roles in this important program by volunteering in various capacities on the competition day in May.

Chief of I & E Marion Larson and Education Specialist Pam Landry made a proposal to the Envirothon Steering Committee to host a Coaches Workshop in the Fall of 2016 at the Westborough Field Headquarters. The proposal was enthusiastically endorsed and an on-site planning meeting with the Education Subcommittee was held in June. The Chief was also appointed to a new organizational body with in the MassEnvirothon, the Massachusetts Envirothon Council whose purpose is to provide support for the event operation in coordination with the Mass. Commission on Soil, Water and Related Resources. The first meeting of the Council was held in June.

Recruitment, Retention and Re-Activation
License Analysis
Nicole McSweeney, Outreach and Marketing Coordinator

MassWildlife contracted with Southwick Associates to analyze data collected by the MassFishHunt licensing system. The Outreach and Marketing Coordinator worked with the R3 Coordinator on this project. The end product of this effort is an extensive, detailed report which profiles fishing and hunting customers in Massachusetts, identifies segments of the population demonstrating growth in hunting/fishing license sales, and provides recommendations on how to use the findings to improve R3 efforts. MassWildlife plans to partner with the Recreational Boating and Fishing Foundation in the coming years to implement some of the recommendations in the Southwick report using a strategic communications strategy.

Astrid Huseby, Hunting Recruitment and Retention Reactivation (R3) Coordinator

The R3 Coordinator is charged with designing and coordinating an overall plan to promote hunting in Massachusetts by enhancing current programs, as well as through the development and implementation of new programs through a Hunting R3 Plan for Massachusetts which was approved in FY 14.

Youth Skills and Recruitment Programs

National Archery in the Schools Program in Massachusetts
This program offers international-style target archery training with a national 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. This means all students have an opportunity to try archery, including many who may not otherwise show an interest in the sport. The NASP curriculum is designed for students in grades 4-12, and includes social studies, mathematics, and physical education. The DFW 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. In order to receive training, schools must obtain the NASP equipment kit, at a cost of about $3,000 and includes 11 Matthew Genesis bows, 122 arrows, 5 targets, 1 arrow curtain, and 1 tool/repair kit. During FY 16, 15 new schools received teacher training in NASP with a total of 85 schools participating in the program across the state. Some schools provided their own funding; others used the new loaner kits that were created this fiscal year.

Young Adult Pheasant Program

The Massachusetts Young Adult Pheasant Hunt Program was developed by DFW 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.

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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 shoot-

Table 2. FY 2016 Youth Pheasant Hunt Participating Clubs

Club	Number of Participating Youth
Carver	18
Essex	10
Falmouth	15
Lee	8
Norco	14
Walpole	9
Worthington	6
TOTAL	82

ing skills, and participate in a special 1-day turkey hunt under the one-on-one guidance of an experienced turkey hunter. The R3 Specialist coordinates the Youth Turkey Hunt. 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.

In FY 16, a 1-day mentored Youth Turkey Hunt was held on April 23, 2016, the Saturday preceding the opening of the spring season. A total of 98 new students (sponsored by 12 clubs) completed the pre-hunt training and participated in the field exercise and the hunt. One hundred and sixty-nine previous-year Youth Turkey Hunt Program participants returned to obtain a youth turkey permit in the 2016 event and did not need to repeat the pre-hunt training and field exercise.

The following sportsmen's clubs participated in the program, in cooperation with the NWTF state chapter (Table 3).
Learn to Hunt Program

A new pilot Learn To Hunt Deer program was designed and introduced for new hunter education graduates who want more information/experience before feeling comfortable enough to hunt. This hands-on course provides training for adult hunters with little or no deer hunting experience to become safe, successful, and responsible deer hunters. The course covers deer hunting skills, including scouting for a hunting area, mapping out possible hunting locations, selecting the right equipment, the safe use of a treestand, shooting practice, and field dressing techniques. Three different courses were held, two one-day clinics held in Conway and Walpole with a total of 52 participants and one 3-day program held at MassWildlife Field Headquarters with 23 participants. Volunteers assisted as instructors.
In the spring the Learn To Hunt Turkey program held its second year of workshops. All courses filled up quickly. 30 participant applicants were accepted into each of the one-day courses. 25 participants were accepted into the 3-day course for deer, and 20 for the turkey course. Many of the participants in both the Deer and Turkey hunt workshops were from more suburban and urban areas in eastern Massachusetts and were new to hunting.

Club	Number of Participating Youth
Barre	9
Carver	7
Cheshire	2
Conway	17
Essex Sportsmen's Association	5
Falmouth	6
Fitchburg	6
Lee	2
Marlborough	9
Norco	14
Stockbridge	9
Worthington	12
Total # New Youth Hunters	**98**
Returning Youth Hunters	169
TOTAL	**267**

Angler Education Program
Jim Lagacy, Angler Education Program Coordinator

The Angler Education Program is an education/outreach program within the Education Section of MassWildlife. It is the main component of the Aquatic Resource Education Program. The other component is Aquatic Project WILD, which the Wildlife Education Specialist oversees. 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 is in part a volunteer-run operation. Each year, the program gains and loses volunteer instructors, and depending on the year, there can be anywhere from 100 to 150 instructors on the roster. All instructors complete a volunteer application and are checked through the Criminal Offender Record Information (CORI) system. They are given pertinent information about MassWildlife and the Angler Education Program, and then begin apprenticing at program events. Instructors are recruited by press releases, our many fishing programs, fairs, sportsmen's shows, positive publicity, and word of mouth. Currently there are 108 volunteer instructors on the roster. Sixty-four instructors or 59% were active during FY 16.

I & E Specialist Emily Callahan assisted

with festivals and clinics and fishing equipment repair and offering clinics on her own. Senior Planner Gary Zima was also active with the program at this time, working at several clinics and other festivals.

Family Fishing Events

There were a total of 28 mostly weekend, family fishing one-day events for FY 16, including our family fishing festivals as well as a few derbies we assist with, and a fall fly fishing fair. In FY 16, these events ranged in size from approximately 35 people to as many as 1,000. The fishing festivals 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. Total estimated participation for Family Fishing Events for FY 16 was 4,159 people.

Fishing Clinics

Our fishing clinics, while short in duration (2 hours), are a very popular program component. These clinics are typically co-sponsored by town recreation departments, sporting clubs, Boy and Girl Scout troops, and or other state or federal agencies that we partner with. These are generally two to three hours long, involving a short lecture on fish, fishing, safety, and ethics, followed by casting instruction and a healthy dose of fishing. Fishing educational handouts are generally provided and clinic participation is kept small enough to allow the instructors to work with participants one-on-one. There were a total of 71 fishing clinics during FY 16. Approximately 2,024 people (mostly children) attended.

Fishing Classes

We run a few fishing classes each year, typically specialty fishing classes like fly tying, or our pilot adult only "learn to fish" classes. A few of the classes were held at the Field HQ. For FY 16, we did 10 classes: 4 fly tying classes, 1 rod building class, 2 adult only "learn to fish" classes, 2 in-school (Auburn HS) Physical Education Fishing Program classes, and one afterschool fishing class at the Beebe School in Malden. Total number of participants for FY 16 was 172.

Fishing Tackle Loaner Program

The Angler Education Program keeps and maintains fishing equipment onsite for loan to various groups throughout the state. We loaned equipment on 31 separate occasions during FY 16, with 962 pieces of equipment loaned. Our loaner equipment includes basic spincasting rods, spinning rods, salt water rods, as well as fly rods and fly tying equipment and even ice fishing gear. Our equipment was loaned to various groups and agencies, including the Massachusetts Department of Conservation and Recreation (DCR), the U.S. Army Corp of Engineers, the U.S. Fish and Wildlife Service, various sportsmen's clubs, scout troops, church groups, and private citizens. Along with the fishing gear, we also make available the necessary terminal tackle and various fishing education program handouts. I & E Specialist Emily Griffin was very helpful with equipment maintenance.

Cooperative Programs

Trout Stocking Programs - These programs are performed in the spring (April and May) with various school groups around the state; and they are more promotional than educational. We occasionally link them to fishing clinics and in-class presentations, but for the most part the schools show up, are given a short lecture about the agency and our fish stocking programs, after which they help DFW staff stock a given pond, lake, or river. For FY 16, we did 6 trout stocking programs, totaling roughly 400 students.

Becoming an Outdoors Woman (BOW) - Since its inception, the Angler Education Program has been involved with the BOW program, and has done all types of fishing programs, including basic spin fishing, salt water fishing, ice fishing, fly fishing and fly tying, as well as supported the program with equipment and manpower. For FY 16, we contributed to 1 BOW program totaling 30 people. This program was a joint project between the BOW program and the Department of Conservation and Recreation (DCR). It was called a BOW Family Camping Weekend. The fishing clinic was part of the weekend and was conducted at the Harold Parker State Forest in Andover. The program also supplied spin casting equipment and a volunteer at the NWTF Women in the Outdoors program where BOW was a partner.

Massachusetts Junior Conservation Camp – The Angler Education Program has always lent a hand to this camp, teaching both the fishing and the fisheries sections, as well as contributing fishing equipment, education materials, and extra manpower. For FY 16, we taught 12 sessions: 6 sessions of basic fishing and 6 sessions of fisheries management.

Massachusetts Envirothon –The Angler Education Program has been involved with Envirothon in various capacities over the years. We currently assist the event at the water learning station, and help to format the tests for the various other stations prior to the event. In FY 16, the Envirothon was held at Hopkinton State Park, where approximately 35 to 40 teams competed.

Massachusetts Junior Conservation Camp

In August 2015, the Conservation Camp held its 2-week session at a new location, Boy Scout Camp Moses in Russell. Facilities at this location are an improvement from the past location. Approximately 120 campers attended. As in the past, MassWildlife staff assisted by 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. The I & E Chief attended meetings of the Massachusetts Junior Conservation Camp Board serving as member of the Board of Directors. She coordinated the scheduling of classes MassWildlife, DCR and Environmental Police staff and some evening programs for camp. She offered a History of Wildlife program on one of those evenings.

The I & E Chief attended several trainings with Senior Staff beyond the usual mandatory state trainings-- Difficult Conversations; Crisis Planning, DCR Supervisor's Academy. At DCR's request, working with the Wildlife Section, she and Mike Huguenin from the Wildlife Section gave a presentation at the DCR Supervisor's Academy at Devens entitled "Hunting 101" which provided basic information about hunting regulations, hunting culture and how to provide hunting information to park users. Public presentations -- Conservation Series (History of MassWildlife); MassWildlife Update, Leominster Sportsmen's Club and 8 Point Sportsmen's Club. After assisting in rescuing an injured bald eagle in Sterling in January, she arranged a small event with District personnel for the eagle's release at Wachusett Reservoir in March.

Becoming an Outdoors Woman Program
Astrid Huseby, Coordinator

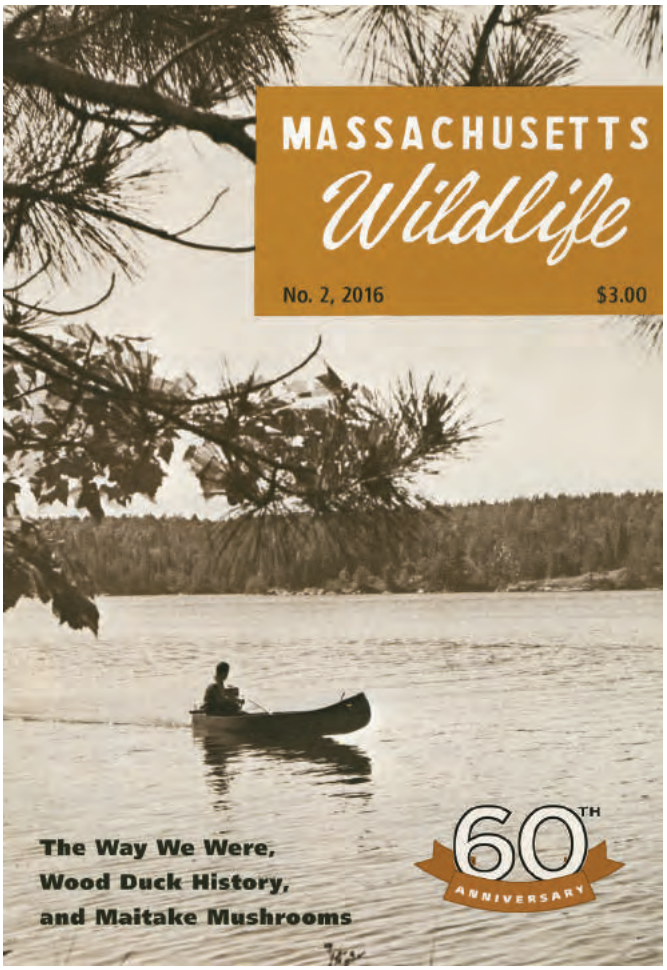
Becoming an Outdoorswoman (BOW) is a program designed for women ages 18 and older, providing basic outdoor skills sessions. This fiscal year (FY16) the Coordinator responsibilities were turned over to Astrid Huseby. Once again, BOW partnered with the Massachusetts state chapter of the NWTF with the Women in the Outdoors Event in July 2015 in which ~120 women ages 13 and up attended. MassWildlife staff offered Bird Identification and Fishing as part of the program and BOW paid for event food. Dates for 3 family camping weekends (Myles Standish in Plymouth; Harold Parker State Forest, Andover and Camp Nihan in Saugus for the summer of 2015 were set with Department of Conservation and Recreation but 2 of the three events were cancelled by DCR due to other agency priorities. The Angler Education program offered a fishing program and the R3 Specialist offered archery as in past years.

Table 4. BOW workshops held in FY 16.

Date	Title of Program and Location	Number of Participants
July, 2015	Women in the Outdoors-Wild Turkey	120
August, 2015	Federation MA Chapter Event DCR/BOW Family Camping Weekend; Harold Parker State Forest, Andover	55 participants (16 Families)
October, 2015	Deer Hunting Seminar, Devens	20
December, 2015	Deer Hunt, Devens	19
April, 2016	Turkey Hunt Seminar, Devens	15
May, 2016	Turkey Hunt, Devens	10
Total Participation		311

Information & Education Staff

Marion E. Larson, Chief, Information & Education
Emily Stolarski, Communications Specialist
Nicole McSweeney, Outreach and Marketing Coordinator
Gary Zima, Senior Planner
Peter Mirick and Troy Gipps, Editor and Publications Manager (partial year)
Bill Byrne, Senior Photographer
David Gabriel, Graphic Designer
Pam Landry, Education Coordinator
Astrid Huseby, Hunting Recruitment and Retention Reactivation (R3) Coordinator
Jim Lagacy, Angler Education Program Coordinator



Hunter Education

Susan Langlois
Administrator

Overview

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 MDFW, and courses are taught by agency 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 to the participants.

Courses

Courses were offered in five disciplines across the state in FY16. A total of 4,898 students participated in the Hunter Education Program in FY 16. Participation increased 5% from FY2015 and is consistent with the 5-year average of 4,588 students. Students are asked to volunteer information on age, gender, and ethnic background on their registration forms. The following is a summary of course offerings and statistics on student participation in FY 16.

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 which 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. Ninety-four courses were offered. Courses were 12-18 hours in length. A total of 3952 students participated and 3663 successfully completed the course. Students are asked to volunteer information on age, gender, and ethnic background on their registration forms: 581 students were minors (under 15 years old), 566 were 15-17-year-old minors, and 228 were minorities. Seven Hundred and eighty seven of the participants were female.

Trapper Education

Mandatory for all first-time trappers, this course includes both classroom work and field training. Students learn the proper use of traps and how to set them, the identification of furbearing animals and their habitats, trapping laws and ethics, and landowner relations.

Seven courses were offered, with a total of 245 participants. Two hundred and fifteen participants successfully completed the course. Thirteen minors (under 18 years of age), 8 minorities and 21 women participated.

Bow Hunter Education

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. Students may bring their own archery equipment to class to obtain advice on its use and care. This certificate is recognized in other states where Bow Hunter Education certificates are required.

Fifteen courses were conducted. A total of 529 students participated and 516 successfully completed the course. One hundred and eighteen minors (under 18 years of age), 18 minorities and 76 women participated.

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. One course was held with 22 students participating and completing the course.

Map, Compass & Survival

This 1-day course includes both classroom work and field training. Topics include instruction on wilderness survival in addition to the use of a compass and topographical map for land navigation.

Eight courses were conducted (two in Pittsfield and seven in Westminster). A total of 149 students participated. Two minorities, 22 minors (under 18 years of age) and 35 women participated.

Shooting Range Development and Enhancement

It is DFW's objective to provide access for the public to range facilities for hunter education and shooting sports purposes by assisting shooting club range development and improvement activities. The Division seeks to amend participation in this funding opportunity. During FY17, the Division anticipates hiring a Shooting Sports / Range Coordinator to further enhance the past successes of this job. The Division anticipates being able to develop RFPs and to procure memorandums of understanding and/or shooting range agreements with third-party entities to increase shooting opportunities and offer advanced (skill-based) hunter education courses to the public across Massachusetts.

Hunter Education Program Staff

Susan Langlois, Program Administrator
Kim Basso, Administrative Assistant
Jennifer Ford, Receptionist
Steve Foster, Program Logistics
Todd Olanyk, Volunteer Coordinator
Kaylee Resha, Hunter Education Specialist
Jesse St. Andre, Hunter Education Specialist
Matthew Stover, Hunter Education Specialist

District Reports

Patricia Huckery, Northeast Wildlife District Supervisor
Jason Zimmer, Southeast Wildlife District Supervisor
Bill Davis, Central Wildlife District Supervisor
Ralph Taylor, Connecticut Valley Wildlife District Supervisor
Andrew Madden, Western Wildlife District Supervisor

Overview

Most people who meet the 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 management, enhancing recreational opportunities, and addressing the wildlife issues pertinent to their regions.

District personnel sell hunting, fishing, and trapping licenses and stamps and selected permits; and they distribute licenses; Hunting, Freshwater Fishing, and Trapping Guides (formerly known as the "Abstracts of Laws and Regulations"); stamps; and other materials related to the sale of hunting, fishing, and trapping licenses to vendors throughout their District. They assist officers from the Office of Law Enforcement (OLE) to ensure public adherence to wildlife laws and regulations and they assist the staff of the Wildlife Lands Section in prioritizing lands to be acquired by locating titles, landowners, and boundaries, and making other arrangements necessary for the acquisition of lands for wildlife.
Staff from all of the Districts conducted these administrative activities. They also participated in a wide variety of survey and monitoring programs initiated by MassWildlife's biological staff based at the Westborough Field Headquarters (FHQ; see the individual Section reports for the status of these projects). Among the survey projects conducted by District staff were the Bald Eagle Breeding Survey, a waterfowl inventory, banding/collaring of Geese, and stream surveys. District personnel also conduct census counts of Wild Turkey, Mourning Doves, Woodcock, Ruffed Grouse, and quail.

District staff members 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. They release pheasants on Wildlife Management Areas (WMAs) and in open covers (suitable habitat on public land). They monitor and maintain the WMAs in their region by cutting brush, mowing, trimming trails, assisting with forest cutting operations, planting shrubs, 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, buildings, and vehicles. They also build and maintain nesting boxes for Wood Ducks, Eastern Bluebirds, and bats, and establish cooperative agreements with farmers who raise crops on MassWildlife land. District staff members also operate check stations, where sportsmen register deer, bear, turkeys, and furbearers taken during the designated hunting and trapping seasons.

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 staffers deal with a large number of beaver complaints, deer damage complaints, bear damage complaints, questions about coyotes, and other issues dealing with the impact of wildlife on human activities, and vice versa.

In addition to the activities that are common to all of the Districts, there are projects that involve only some of the Districts; these are detailed, when and where applicable, below.

Northeast District

Administration

It was a year of great change for the Northeast District (NED) staff. The NED Wildlife Biologist position was moved to the Wildlife Section at Westborough Field Headquarters. One Wildlife Technician was incapacitated by a back injury. One Wildlife Technician transferred back to the Sunderland Fish Hatchery. A third Wildlife Technician briefly left to work at a position outside the Division, only to return to his position several months later.

Three NED staff participated in the Division's 150th Birthday Party, assisting the public in the reptile room, providing educational materials about bald eagles for the bird exhibit

(including a full-sized eagle nest), and showing off the stocking truck fleet.

A house and shed were demolished at Salisbury Marsh Wildlife Management Area. Project permitting, contract preparation and oversight were handled by District staff. Three stone benches were created from the foundation stones for the public's peaceful enjoyment of the nearby salt marsh and Merrimack River.

The District Supervisor assisted Westborough staff with the development of a National Coastal Wetlands Grant (NAWCA) application to fill a funding gap in the Kent's Island Bridge Salt Marsh Restoration Project at William Forward Wildlife Management Area. The District Supervisor developed and reviewed documents, and attended site visits relating to the filing of the Kent's Island Creek Salt Marsh Restoration Expanded Environmental Notification Form under the Massachusetts Environmental Policy Act. NAWCA grant land acquisition and conservation easement projects were organized, researched and completed as needed.

Northeast District staff assisted the Division's Habitat staff with the preparation of a Notice of Intent under the MA Wetlands Protection Act Regulations for the Scotland Road forestry access road project. This included attendance at the bidder's conference and Notice of Intent hearing with the Newbury Conservation Commission.

Two steel gates were installed at both ends of J.B. Little Road at Crane Pond WMA with assistance from the Groveland Highway Department. This action was prompted by complaints from the Groveland Police Department, Environmental Police, and local authorities about significant safety and dumping issues.

Computers were upgraded, as well as the District Supervisor's cell phone. A project scanning federal land taking files was initiated. A much-needed electrical upgrade occurred in the shop and Wildlife Technician building.

Boundary delineation contracts were overseen by the Stewardship Biologist. Survey work was conducted and field checked off Seven Star Road at Crane Pond WMA. A Forest Cutting Plan and Resource Management Plan were reviewed for Surrenden Farm Wildlife Conservation Easement in Groton. Habitat project priorities were discussed, set and submitted to our Biodiversity Initiative team.

In the District office, staff repaired equipment, readied tractors, sharpened tools, and maintained trucks.

An Ashby WMA mowing trespass off Pillsbury Road was found and stopped by closing off access with snow fencing and talking to the person doing the mowing. A lawn mowing trespass at Elbow Meadow WMA was resolved. At least a dozen other encroachments were discovered during boundary work. Our Northeast District Stewardship Biologist joined with the Environmental Police at a trespass site visit and meeting held with neighbors living on Long Meadow Drive abutting Salisbury Marsh WMA. This trespass was a multi-family, multi-year trespass including everything from fencing and dumping to a large tree house and a 15 acre OHV track.

The District Supervisor attended meetings concerning Mt. Watatic Reservation management, Essex County and Norfolk County League business, and MassWildlife Senior Staff and District Supervisors' matters. Northeast District and Westborough staff jointly met with the new environmental supervisor at Devens to discuss the continuance of the Paraplegic Hunt, On Becoming an Outdoors Woman hunts, and hunting in general. LART training meetings were attended. Mt. Watatic Advisory Committee meetings focused on correcting signage problems near the top of the mountain where many hikers go awry. Meetings were held with The Trustees of Reservation regarding the NAWCA Choate Island Shrubland Restoration project.

District staff worked with our Realty Section collecting trails information as part of developing a trails policy. Multiple Trails Policy meetings were attended and comments were provided on draft documents. The initial focus was on major trails that currently exist on MassWildlife lands. In the Northeast District that includes the Bay Circuit Trail at John C. Philips Wildlife Sanctuary in Boxford, and the Wapack Trail at Mt. Watatic Sanctuary in Ashby/Ashburnham. Comments were also provided on the Wildlife Lands Policy.

Wildlife Lands Map write-ups were drafted, reviewed and submitted. LIS (Land Information System) trainings were attended by our Stewardship Biologist and District Supervisor. Our Stewardship Biologist attended fire training at Camp Edwards. As a regular part of land acquisition, new core parcel selections were conducted with assistance from Natural Heritage & Endangered Species staff. The District Supervisor's land acquisition activities included reviewing parcels for their ecological and recreational significance on properties throughout the district and attending Lands Committee meetings.

A site visit was attended for the proposed Byfield Estates project off Pearson Drive and abutting Martin Burns WMA. The current proposal is for 25 houses and entails clearing up to the boundary and wetland lines.

Research and Conservation

Wildlife

District staff participated in the Canada goose banding project, developing the necessary number of banding sites throughout the District, and assisting with the banding effort. There were over 200 Canada Geese banded across three counties, meeting the Northeast District quota. District staff banded waterfowl from the airboat in August and September. The Wood Duck project was hindered by warm winter weather. The lack of firm ice prevented staff from reaching nest boxes. A GIS project to map all wood duck boxes was initiated. Northeast District staff assisted Connecticut Valley district staff with the black bear reproduction and habitat use study.

The sixth year of Black Duck banding effort was also hampered by warm winter weather which kept Plum Island Sound open. Due to the lack of icy conditions, the birds did not concentrate at trap sites, but were widely distributed throughout the Sound, eating the readily natural food. Staff met with U.S. Fish & Wildlife biologists to coordinate trap checks and banding.

Twelve deer check stations operated within the District. Seven hunters took part in the paraplegic hunt held at Devens, at which one 8-point deer was taken. Large Animal Response Team training was held at the Connecticut River District Office and was attended by the District Supervisor.
Habitat mapping was conducted at Kent's Island at William Forward WMA as part of a proposed NAWCA (North America Wetlands Conservation Act) enhancement project for American Black Duck. Twenty five acres of shrubland are currently proposed and will proceed once Kent's Island Bridge is replaced. The purpose of the mapping project was to survey other areas of possible shrubland expansion on Kent's Island. Time was spent on permitting for the Kent's Island Bridge salt marsh restoration project in coordination with the MA Division of Ecological Restoration.

The Stewardship Biologist oversaw shrubland restoration conducted by habitat contractors at Martin Burns WMA in Newbury.

Fisheries

A new stocking truck arrived just in time for spring trout stocking.

Northeast District staff conducted site selection visits with staff from the Nashua River Watershed Association as part of their grant to revegetate buffer areas along stream and rivers. Two sites were selected within the Squannacook River WMA, at the VFW Pond and Turnpike Road areas.
During the summer, staff conducted stream surveys on 42 brooks and rivers in ten major watersheds. There were no reports recorded for fish kills. In response to complaints, additional discussions and site visits with Wrentham town officials were held to ensure fair access for anglers to Lake Pearl.

Natural Heritage and Endangered Species

Environmental permitting advanced on a turtle nesting habitat project at Upper Parker River WMA located in Georgetown and Groveland. The Stewardship Biologist oversaw the selected contractor who created 3 acres of turtle nesting mounds. A nest site monitoring plan was devised in coordination with local conservation volunteers.

Bald Eagle nest surveys were conducted in April at known and potential nest sites in Tyngsborough, Amesbury, Methuen, Haverhill, Newbury, Waltham, Concord, and Framingham. Two chicks were banded from the Amesbury nest, and one from Waltham nest, with assistance from the climbing crew out of the Southeast District. Northeast District Wildlife Technicians constructed two peregrine falcon boxes for use by our Natural Heritage & Endangered Species Program.

Enhancement of Outdoor Recreation

An important hunting access project was initiated with MA Department of Conservation and Recreation where state lands with confirmed impacts from an overabundance of deer were identified. As part of this project, District staff participated in deer browse surveys beginning in May of 2016 at key state parks and forests within Essex, Middlesex, Norfolk and Suffolk Counties. Browse surveys were also conducted on town land in Carlisle as part of a municipal effort to manage the local deer herd.

Combined spring and fall trout numbered 116,240. In the fall, anglers saw 15,600 14-inch Rainbow Trout released into 2 rivers and 18 lakes and ponds, followed in the spring by 100,640 Rainbow, Brown, and Brook Trout in 42 ponds, 7 major rivers, and 66 brooks and minor rivers.

Five-thousand pheasants were released into five WMAs and 11 open covers. There was no loss in the number of pheasant covers. No one applied for a Special Pheasant Stocking Permit at Martin Burns WMA. The Danvers Fish and Game Club ran a successful Youth Pheasant Hunt at Martin Burns WMA, with 8 youngsters participating and Walpole Rod and Gun Club held their hunt at Charles River WMA. MassWildlife conducted a Youth Hunt Seminar sponsored by the Danvers Fish and Game Club. Controlled pheasant hunts were

held at Martin Burns WMA and a controlled waterfowl hunt was offered at the Delaney WMA. MA Environmental Police officers assisted with stocking Kent's Island since the bridge is in poor condition and not accessible to stocking trucks. Four clubs were issued field trial permits for Delaney WMA. No camping permits were issued, and 582 range permits were issued.

Outreach and Education

The District Supervisor attended the Carlisle Conservation Breakfast in February to discuss trending wildlife subjects. The 1st annual Vernal Pool Walk was held by MassWildlife on The Throne in Groton with over 20 adults and children attending.

Conservation breakfasts were attended with colleagues from Groton, Pepperell, and Townsend. Current and emerging issues regarding state-listed turtles were discussed, as well as other pertinent conservation matters. The 2nd Annual Groton Conservation Summit was attended by District staff to highlight important conservation projects.

A great deal of wildlife education happens every day in the District during each wildlife-conflict call. The Northeast District public is sometimes naïve about wildlife, so the staff guides them to a better understanding of each animal through listening and conversation, teaching people how to help themselves, directing people to the MASSWILDLIFE website for our "Living with Wildlife" series of educational materials, or connecting them to appropriate local authorities who can assist them further.

Coordination, scheduling, and booth coverage for the Topsfield Fair were handled by District personnel with capable assistance from Westborough staff. Staff also worked the Boston Flower Show, Worcester Sportsmen Show and contributed their services to the annual Massachusetts Outdoor Exhibition ("The Big MOE"). A "Living with Wildlife" workshop was conducted at Middlesex County 4-H Winter Forum.

Staff attended Parker River Clean Water Association and Nashua River Watershed Association Annual Meetings where old and new conservation friends socialized.

The District Manager attended a state-offered Manager's Webinar.

Technical Assistance

District staff dedicates many hours patiently listening to and helping the public with questions about wildlife they see around their houses and in their yards. That information is recorded on report forms and submitted to Westborough Field Headquarters.

A coyote talk was held in Gloucester Town Hall in response to increasing bold behavior of some animals. Prior to the talk, a site visit was conducted in the areas of greatest concern. A baiting area was discovered. At the presentation were the District Supervisor, local police, Environmental Police, town officials, and Animal Control Officers. When queried, almost everyone in attendance raised their hands when asked if they had a bird feeder in their yard or have a neighbor who feeds birds.

Southeast District

Administration

There were two personnel changes in the Southeast District in FY16. Nathan Buckhout transferred to the vacant Western District Game Biologist position in December and Stephen Wright, Wildlife Technician III was promoted to the vacant Southeast District Game Biologist position in May. The vacant Wildlife Technician III position was posted internally in June and should be filled early in FY17.

District staff attended and/or completed a variety of different training programs in FY 16, including the Safe-capture Chemical Immobilization of Animals course at the Franklin Park Zoo, the Southeastern Massachusetts Pine Barrens Alliance annual conference, Difficult Conversations training, Land Information System training, a Human Dimensions in Wildlife Conference, Large Animal Response Team training, Discipline training, Pesticide Applicator's License training, Vernal Pool Reporting System training, Forestry training, the MA Land Trust Coalition 2016 Mass Land Conservation Conference and various prescribed fire trainings including RX310 Burn Boss training, a fire fuel models class, a BEHAVE workshop and a National Weather Service fire weather training course.

The District Supervisor attended a Legislative listening session regarding agency regulations at the Cape Cod Community College. Meetings were also held with the Division of Marine Fisheries over the continued use of MassWildlife land and buildings located at the Old East Sandwich Fish Hatchery property on County Road in Sandwich. Discussions are ongoing; however DMF will be able to continue utilizing some of the buildings to house their equipment, while MassWildlife will regain use of the main workshop, which will be converted to a wood shop for District projects. District Staff completed its biannual inventory of equipment and supplies required to keep track of items and beneficial to staff in that it allows a time for reorganization, evaluation of the condition of various pieces of equipment and the

ability to plan for disposal of old/broken items and replacement of them in the coming FY.

Steve Hurley, Fisheries Manager, received the Guardian Award from the Buzzards Bay Coalition "for his quarter-century of dedication to protecting "salter" brook trout habitat in southeastern Massachusetts."

The District Supervisor and Land Agent continued to oversee the cleanup of wetlands on Burrage Pond WMA that were impacted by runoff from an abutting industrial site. The District Supervisor issued multiple license agreements allowing the environmental company hired to oversee the cleanup to investigate the extent of the contamination and develop and begin to execute remediation operations.

Several Capital improvement projects were completed at the Southeast District HQ in FY16, which will help improve staff working conditions and protect our main office building. The addition of a new staff person to the District late in FY15 (Stewardship Biologist Aaron Best) placed further strain on already cramped working conditions for field staff. As a result, the District identified the need to expand office space to accommodate field staff and add another meeting area and proceeded with a project to convert the rear portion of the main office to finished office space for the technicians and stewardship biologist. The main office exterior was also scraped, primed, and repainted/stained in FY16, protecting the building from water damage and improving its appearance.

Research and Conservation

Wildlife

District staff completed breeding surveys for ruffed grouse and various waterfowl species as assigned by Wildlife Section biologists. District staff also conducted annual winter American black duck trapping and banding, successfully banding a total of 452 ducks throughout Plymouth, Bristol, and Barnstable counties. The District also assisted Westborough staff in completing duck banding at the New Bedford Reservoir using MassWildlife's airboat. Nesting boxes for wood ducks were monitored, maintained and replaced on MassWildlife lands and other public and private lands. District staff participated and assisted with Westborough staff in trapping and banding Canada geese in Barnstable county, Plymouth county and Bristol county, meeting the desired quotas. District staff also conducted summer mallard banding and collected numerous Avian Influenza (AI) samples from both summer and winter banded dusks as part of ongoing monitoring of AI in wild waterfowl populations.

The District assisted with ongoing New England Cottontail research and survey efforts, conducting pellet collection surveys throughout parts of southern Plymouth and Bristol Counties and on Cape Cod. NEC trapping efforts were successful again in FY16, with District staff capturing six rabbits (4 females, 2 males) that were transported to the Roger Williams Zoo and the Queens Zoo to participate in a captive breeding program. One male from last year's trapping effort was returned to Massachusetts and released back at its original capture location.

The District completed a number of habitat management and improvement projects in FY15, mowing over 200 acres on our WMAs and planting more than 40 acres. The District also assisted with the planning, permitting and completion of over 90 acres of prescribed fire on wildlife management areas as well as assisted in prescribed fires on Joint Base Cape Cod, Town of Mashpee conservation land, Manuel Correllus State Forest on Martha's Vineyard and in the Marconi Cooperative WMA at the Cape Cod National Seashore. The District continued to be heavily involved in the planning, monitoring and public educational aspects of several ongoing, major habitat restoration projects in Southeastern Massachusetts. District staff assisted in the planning stages of each project and conducted public site walks, answered public inquiries on the projects, met with and monitored contractors in the field, monitored vegetation in the project areas and conducted necessary surveys for wildlife species throughout the duration of the projects. Projects that the District were involved with this FY included the Cooks Pond WMA coastal plain pond restoration project, Red Brook stream and wetland restoration project, Frances A. Crane WMA grassland and pitch pine – scrub oak woodlands restoration project, Burrage Pond WMA emergent wetlands restoration project and pitch pine – scrub oak woodlands restoration projects at the Southeast Pine Barrens WMA and Camp Cachalot WCE.

District staff also investigated numerous reports of wildlife that were sick, injured or dead as a result of a variety of causes and took the appropriate action, depending on the situation. The Staff also uses this interaction with the public to educate them on wildlife biology and management. Several staff members on the LART Team responded to reports of an injured deer trapped inside a fenced detention basin off the edge of Route 24, a major highway in the District. The deer was located and safely immobilized and transported to a safe area in the Freetown State Forest before the immobilizing drugs were reversed and the deer was allowed to slowly recover.

District staff also operated a number of game check stations during deer and turkey season, collecting biological data used in management of these important game species. Two District staff in particular, Jeff Breton and Dan Fortier,

were particularly helpful during biological checking for deer, spending long hours on the islands of Nantucket and Martha's Vineyard, respectively, after working extended hours the week before. Further, as we have for the past few years, District staff entered all biological deer and turkey data collected into the MassFishHunt online system, allowing for our biologists to review and analyze the data more efficiently. Staff also conducted a number of deer browse impact surveys on both Town and DCR lands in the District to assist our deer biologist in assessing deer densities across the region and focus efforts to improve hunting/management access accordingly.

Several license agreements were issued on District WMAs, allowing private individuals or companies to perform activities on District lands that are designed to result in a net benefit to wildlife and wildlife-dependent outdoor recreation. License agreements were issued or renewed at Frances A. Crane WMA, Hockomock Swamp WMA, Dartmoor Farms WMA, Red Brook WMA and Noquochoke WMA.

Fisheries

Pond and stream surveys, using electro-fishing, gill netting, rod/reel survey and other techniques, were completed in a number of southeastern Massachusetts waterbodies in FY16 in consultation with the Fisheries Section in Westborough. Passive integrated transponder tagging research on brook trout continued in Red Brook, Quashnet River, Childs River and Coonamessett River.

The District continued our excellent relationship with the Sandwich Fish Hatchery, 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 District Fisheries Biologist continued our efforts to monitor stream temperature in many southeastern Massachusetts systems in order to better manage these systems, warn of dangers or issues, and provide a baseline set of data. He also cooperated with Trout Unlimited on a variety of projects, including the PIT tagging research. New water temperature and level loggers were deployed at Red Brook and the stream temperature monitoring network was expanded with assistance from the Sea Run Brook Trout Coalition.

The Red Brook restoration project progressed significantly in FY16, with much of the new/re-naturalized channel being constructed by the AD Makepeace Company under the close guidance of Steve Hurley, Fisheries Manager. Roughly 7,000 feet of stream channel was created to become the new path for Red Brook, in place of the existing, extremely altered channel that flows through the former cranberry bog complex. The Fisheries Manager and others in the District, providing necessary project oversight and guided the contractor in the construction of the channel, slope stabilization and the placement of cobbles and woody materials in the channel. Further, as this stream is an active herring run, staff had to continually monitor flows and herring passage throughout the spring, ensuring there were no problems with fish passage. District staff will continue to work with the other agency personnel, and project partners like Trout Unlimited, the Trustees of Reservations and the Sea Run Brook Trout Coalition, to advance the larger restoration project, which includes extensive wetlands restoration and upland habitat enhancement, in FY17 and beyond. This will hopefully be accomplished with the assistance of a National Coastal Wetlands Program grant, which we will begin to prepare an application for in early FY17.

Technical assistance including fish sampling was provided to the Division of Marine Fisheries (DMF) and researchers from MIT for a study on the impacts of river herring on the food webs in Great and Herring Ponds in Eastham and Fresh Pond in Plymouth. Sampling assistance was also provided to DMF in sampling American Shad in the South River and discussions were begun with DMF on the impact of stream maintenance for herring passage on brook trout habitat. Sampling assistance and guidance was provided to De Sales and Lafayette University professors studying the potential effects on fish of estrogen mimic chemicals (organic wastewater compounds) in groundwater fed ponds on Cape Cod.

Technical assistance was also provided to USGS biologists surveying the Mashpee and Santuit Rivers upon request of the Mashpee Wampanoag Tribe. These surveys turned up the apparent disappearance of the brook trout population in the Santuit River. Further work on this included follow-up fish surveys, data review, media contacts and several meetings to determine potential causes and a path forward to restore brook trout habitat and populations to this river.

Technical assistance and filed visits were also provided for a potential dam removal on the Jones River in Kingston, an alum treatment to help control algae blooms in Cliff Pond in Nickerson State Park in Brewster and road runoff issues to Nye Pond and the Old Sandwich State Fish Hatchery.

Technical assistance was also provided to USGS researchers studying groundwater/surface water interactions and brook trout habitat in the Quashnet River. The Fisheries Manager also served as an instructor at a week long USGS course on groundwater/surface water interactions which took place at Woods Hole and the Quashnet River in June 2016. Students and instructors from throughout the country attended this course.

The restoration of brook trout to the Childs and Coonamessett Rivers by transplants of wild brook trout were evaluated by surveys in the Fall of 2015 and Spring of 2016. A very successful spawn from the transplanted fish was documented in each river which further validated this technique for brook trout restoration. The fisheries manger attended meetings of the Sea Run Brook Trout Coalition and the Southern New England chapter of the American Fisheries Society.

Technical assistance was provided to the Falmouth Rod and Gun Club on a Child River restoration project.

Natural Heritage and Endangered Species

The District cooperated with the Natural Heritage & Endangered Species Program (NHESP) staff on a variety of projects this fiscal year. District staff continued with our increased involvement in coastal shorebird monitoring and management, participating in planning meetings and training sessions, monitoring various plover, tern and American oystercatcher sites, installing and maintaining symbolic fencing and signs and interacting with the public and beach managers on a variety of issues related to shorebird management. Several District staff were also involved in planning meetings and other efforts associated with the development of a Habitat Conservation Plan for piping plovers, which should provide some flexibility to beach managers that sign on to the program in managing certain public access issues associated with piping plovers on beaches. Coastal shorebirds were monitored by District staff at Long Island and the South Shore Marshes WMA in Fairhaven, Brandt Island Causeway, Strawberry Point and Angelica Point in Mattapoisett, Fox Island WMA in Wellfleet and Planting Island in Marion.

The District was heavily involved with ongoing coastal plain pond management and a significant restoration project (as mentioned above) at our Cooks Pond WMA in Plymouth. District staff routinely monitored water levels in the pond and made adjustments and repairs to the water control structure, with guidance from NHESP staff, to create habitat conditions beneficial to the many plant and animal species that rely on coastal plain pond shore habitat. Further, the District was involved in the development, permitting and oversight of the restoration project, which included the removal of sediment that had accumulated in a portion of the pond shore, filling and stabilization of an illegal ORV roadway that caused the sedimentation, repairs to the main water control structure and native plantings.

District staff participated in the annual spring bald eagle census, covering portions of Plymouth, Bristol and Barnstable County. District staff also monitored known eagle nesting locations and investigated reports of potential new nesting sites. We had a total of six active eagle nests in FY16, including a newly identified nest on Silver Lake in Halifax. All six nests were successful in fledging young. The District climbed five of the nests (Westport tree not safe to climb) and banded a total of 10 healthy chicks from the Halfway Pond (2), North Watuppa (2), Pocksha Pond (2), Anuxanon Island (2) and Silver Lake (2) nests. The Westport pair were monitored periodically and were documented to successfully fledge two healthy chicks. The District received consistent reports of adult eagles near Mashpee-Wakeby Pond on the Cape, near Sampsons Pond in Carver and at Manchester Reservoir in Attleboro and suspect that nests in all three of those areas will be discovered in the near future. We also assisted the Northeast District by providing staff to climb two of their nests, one in Waltham and one in Amesbury. District staff also monitored our five known peregrine nesting sites in Fall River, New Bedford, Brockton, Taunton and Sandwich/Bourne and assisted NHESP staff with banding efforts.

The District continued supporting the tern project in FY16, assisting with a wide variety of projects over the course of the year including storing and transporting boats and equipment, field surveys and habitat improvement projects. Further, District staff spent countless hours and materials in preparing the house at our Red Brook WMA to serve as a location for field staff (supporting the tern project and other MassWildlife projects) to live. This effort included removing old carpets, cleaning, scraping, priming and painting all interior ceilings, walls and trim, the installation of new carpeting, electrical work, installation of new water fixtures and energy efficient lighting units and plumbing repairs. The Division also received a donation of new kitchen appliances (microwave, oven and refrigerator) from a local business, Crane Appliance in Falmouth, in support of the tern project. The Division also received donations of furniture for the house and purchased new beds for field staff to use.

The District played a role in reviewing and monitoring the new project to restore Common Loons in the Assawompsett Pond Complex, where we own several wildlife conservation easements. District staff visited the loon project site and periodically checked in on the project as well as answered questions from the public relative to the effort.

In early January of 2016, the District discovered that several trucks, and perhaps one ATV, broke through the main gate at our Frances A. Crane WMA and caused extensive damage to the recently restored grasslands and the Otis Model Aero Club (OMAC) flying field. The District received strong support once again from the OMAC members, who assisted in repairing the damage to the WMA and worked extensively with local and state law enforcement and vari-

ous media outlets to attempt to identify the suspects. The investigation was still ongoing at the close of FY16; however the media attention alone appears to have worked to deter illegal vehicular traffic at the WMA.

Enhancement of Outdoor Recreation

District staff stocked its fall 2015 allocation of 13,500 trout into 25 ponds and stocked its spring 2016 allocation of 83,170 trout into 52 ponds and 27 streams. The staff provided birds for another safe and successful upland game bird hunting season, stocking just over 7,900 pheasant and 3,500 quail on six WMAs and over 12 open covers throughout the District. 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 MASSWILDLIFE'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 MASSWILDLIFE's Young Adult Pheasant Hunt, and assisted with the operation of the hunts at both clubs.
The District operated and managed controlled-access hunting opportunities for white-tailed deer, wild turkey, and coyotes on the Massachusetts Military Reservation (MMR). These efforts provided hundreds of sportsmen with the opportunity to hunt on roughly 9,500 acres of open territory on the MMR. A total of 31 deer and 9 turkeys were taken during the regular 2015 deer and regular 2016 turkey seasons on the MMR, respectively. Further, the District worked closely with base personnel and volunteers from the Barnstable County League of Sportsmen to offer the Division's annual paraplegic deer hunt, with five participants all seeing deer. The District also worked with MMR staff to again provide very successful youth deer and turkey hunting programs at the MMR. District staff also supported the implementation of the Blue Hills Reservation Deer Management Plan by assisting with the second segment of the controlled deer hunt.

The District Supervisor issued permits for a total of 46 special winter game bird hunts, 12 at the Erwin Wilder WMA and 34 at the Frances A. Crane WMA. A total of 73 pheasant and 795 bobwhite quail were stocked during these hunts. A variety of field dog trials were reviewed and permitted by the District Supervisor, including four upland bird dog trials at Frances A. Crane WMA.

The District continued to maintain and improve roads, trails, parking areas and fields on our wildlife management areas and access areas to provide for safe and effective access to our properties for all forms of passive outdoor recreation. All fields and access trails at the Myles Standish State Forest WMA were mowed, as well as fields and trails at the Frances A. Crane WMA that were not mowed in FY15. The Great Herring Pond Access was improved significantly this FY, with vegetation being cleared out to increase visibility of the parking area from the main road, which resulted in a major decrease in illegal dumping/activity at the site. Gates were also installed or maintained at many WMAs this fiscal year including Hockomock Swamp WMA, Old Sandwich Game Farm WMA and Burrage Pond WMA.

Boundary marking is ongoing on many WMAs throughout the District, including some additional boundary work completed with an additional allocation of funding directed towards hiring contractors to complete boundary surveys and marking. Portion of the boundaries of several properties were surveyed and marked in the field this fiscal year including Southeast Pine Barrens WMA, Mill Brook Bogs WMA, Burrage Pond WMA, Maple Springs WMA, Mashpee Pine Barrens WMA, Fox Island WMA, Red Brook WMA, Cooks Pond WMA, Halfway Pond WMA and Camp Cachalot WCE. District staff conducted routine monitoring visits and prepared monitoring reports for all 32 of our Wildlife Conservation Easement properties to ensure public access is available, identify any management issues and ensure that the underlying landowner is complying with the terms of the recorded Conservation Easement document.

Wildlife viewing and waterfowl hunting opportunities were enhanced at the Burrage Pond WMA by District staff seasonally flooding various portions of the habitat restoration area/former cranberry bog complex and mowing/maintenance of the many dike roadways that provide public access on the WMA. The main access roadway and parking area was also professionally filled and graded to improve public access to the WMA.

The District used cellular-linked remote camera traps to help address illegal OHV activity and illegal dumping on several of our WMAs. We coordinated closely with the Massachusetts Environmental Police, using these camera systems, which provided them with information leading to more effective enforcement.

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. The Division's annual Guide to Hunting, Fishing & Trapping was delivered to all license vendors, State Parks and a variety of other locations throughout the District.

Southeast District personnel prepared and staffed displays at the Marshfield Fair, Standish Sportsmen's Association Sportsman Show, Thornton Burgess Society Animal Day and

the Falmouth Rod and Gun Club's Youth Day.

District staff also attended, presented at and answered questions from the public at site walks highlighting various habitat management projects on Frances A. Crane WMA, Southeast Pine Barrens WMA and Camp Cachalot WCE. The District also installed interpretive signage at all MASSWILDLIFE lands where active habitat management was occurring. The District Supervisor hosted an intern from Freetown who assisted with the oversight of our Mill Brook Bogs WMA and volunteered on several projects including our annual winter black duck banding project, Canada goose banding and coastal shorebird monitoring project, among others.

The fisheries manager gave talks to a Massachusetts Maritime Academy Environmental Monitoring Class and the Coonamessett River Trust and was filmed for as segment on scientists in the MOSES Union The fisheries Manager as provided information for a front page story in the Cape Cod Times on the apparent loss of the Santuit River Brook Trout population. Electrofishing demonstrations, PIT tagging demonstration and talks at the Quashnet River were given to an Falmouth AP Environmental Studies Class, an Americorps crew and Tidal Quest summer science camp class. Interns from the University of Wyoming and Massasoit Community College assisted the fisheries manager in the summer and fall of 2015 as well a total of eight weekly interns from Patagonia Inc. provided with the assistance of the Sea Run Brook Trout Coalition. The Fisheries Manager was also heavily involved in the planning and preparation of the Division's new trout stocking web page that provides much more detailed and timely information on our trout stocking activities to Massachusetts anglers.

District staff assisted with the National Archery in the Schools Program (NASP) by delivering and retrieving course materials and equipment to and from schools in southeastern Massachusetts that participate in the program. Two District staff, Jason Zimmer and Steve Wright, became certified NASP instructors in FY16. Steve used his new NASP instructor certification by assisting with that program at the Division's 150th Anniversary Celebration at our Westborough Field HQ in June.

Online game checking training was given by District personnel to staff at several of our game checking stations. The District Supervisor gave a presentation on animal adaptations and classification to 3rd grade students at the Governor Winslow Elementary School in Marshfield as part of their STEAM Lab curriculum.

Technical Assistance

District staff assisted other MassWildlife personnel; federal, state, and local agencies and organizations; and members of the general public to accomplish a wide variety of projects to protect and conserve native wildlife populations and their habitats. District staff also provided technical assistance and field support to municipalities, law enforcement personnel, and the general public relative to dealing with wildlife issues.

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 and aggressive wild turkeys. Numerous site visits were made to meet with concerned citizens and information was provided to either quell their concerns or empower them to take steps to reduce the probability of conflicts such as proper yard maintenance, harassment and pet husbandry. Other animal calls handled by the District in FY 15 included deer, hawks, fisher, raccoon, peregrine falcon, fox, geese, eagles, turtles, and many species of small mammals. The "Living with Wildlife" publication series and educational messages were provided to many individuals and organizations to assist in dealing with these human-wildlife conflicts.

Notable wildlife issues or calls that District staff responded to in FY16 included a number of calls reporting aggressive hawks in people's yards. Most turned out to be situations where the hawks had nested in or adjacent to the yards and the adults were protective as the young approached fledging. In all cases, the homeowners were advised to take appropriate precautions (such as wearing a ball cap and being vigilant), to wait out the situation, as most of the chicks were very close to fledging when site visits were conducted and to look into having the nest removed and one of the supporting branches cut down once the chicks fledged to deter future nesting attempts at that location.

Staff also met with and provided technical assistance and advice to residents and officials in the Town of Provincetown following reports of people illegally feeding and providing medication to red foxes that had sarcoptic mange. The Division provided several options for local officials to address the issue, including letting nature take its course, trapping and humane euthanasia or trapping and transporting to a wildlife rehabilitation facility for treatment.

Staff also responded to numerous complaints in the Town of Falmouth regarding aggressive male turkeys causing problems in the downtown area, the same birds that had made National news reports and the Jimmy Fallon Show for attacking the mail carrier every day. District personnel conducted multiple site visits over the course of several weeks, educating the public not to feed the turkeys and attempting to harass the birds to move them from the and/or re-instill some fear of people. The turkeys continued to be aggressive/problematic, so two of the three most aggressive birds were captured and euthanized, solving the problem as the complaints completely stopped. District staff continued to monitor the situation and educate the public on how to live with turkeys.

The District Supervisor and Fisheries Manager met with the Division of Marine Fisheries and several interested organizations like Trout Unlimited, to review the management of woody material removal for herring passage in coldwater streams that also hold native brook trout populations. This effort will eventually result in the development of best management practices for woody material management in coldwater streams and ultimately protect wild brook trout habitat, while still allowing for effective anadromous fish passage.

District staff 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 Southeastern Massachusetts Bioreserve Management Team, the Cape Cod Rabies Task Force, the Mashpee National Wildlife Refuge Management Team and the Comprehensive Conservation Plan (CCP) Planning teams for Mashpee, Monomoy, Nantucket, Massasoit and No Man's Land Island National Wildlife Refuges. The Fisheries Biologist was actively involved in monitoring the Massachusetts Military Reserve (MMR) cleanup activities as a member of the Plume Containment Team.

The District Supervisor attended 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.

Central Wildlife District

Administration

The District Wildlife Biologist position was recreated and filled during the fiscal year via the internal promotion of Technician Mike Morelly to Game Biologist. A new Stewardship Biologist position was created and filled during the fiscal year via the internal promotion of Technician Scott Kemp. As of the end of the fiscal year the two Technician vacancies created by the internal promotions were filled by Jack Bonafini and Ethan LaPlante.

Three District Technicians participated in prescribed fire training at the Mass Military Reservation on Cape Cod. The District Manager and Wildlife Biologist participated in two days of immobilization training sponsored by Safe Capture International.

A backup propane generator, salvaged from the former Hunter Education building in Westminster, was installed at the District office.

Tests for asbestos were conducted on buildings to be demolished at the Muddy Brook, Winimussett and Quaboag WMAs

Research and Conservation

Wildlife

District personnel oversaw the operation of 14 Deer check stations, 15 Turkey check stations, 12 Eastern Coyote check stations and one Black Bear check station. Electronic game checking was used at the District office for turkey, deer and furbearers. Beaver, Otter, Coyote, Fisher, Bobcat and Fox pelts were tagged and recorded or checked online.

Ruffed Grouse, American Woodcock, and Mourning Dove censuses were completed. Canada Goose leg banding was conducted in Central District with Waterfowl Project Leader H Heusmann. 103 geese were banded at 12 sites. 256 Wood Duck nesting boxes were checked and 29 new boxes erected at various wetland sites. Donations of metal poles and wood duck boxes were accepted from sportsmen and the general public. Rough cut lumber for wood duck box construction was milled at a DCR sawmill at the Otter River State Forest and at a private mill in Townsend.

Turkey brood reports were submitted during the three month study period.

Scheduling and stocking of 12,912 Ring-necked Pheasant was completed and 4,000 7- week old pheasants were distributed to 13 sportsmen's clubs and 2 correctional institutions for rearing. Pheasants were released on 17 Wildlife Management Areas (WMAs), 4 town coverts and participating club properties. Bolton Flats and Winimusset WMAs were available for the winter pheasant hunting opportunity in Central District. One application was received for Winimusset and two for Bolton Flats.

Radio telemetry studies were continued focusing on track-

ing 3 collared black bear. One bear did not den, one flushed before it could be immobilized and one sow was successfully immobilized and the collar changed.

Investigations of potential bear depredations were conducted in Brookfield and Sturbridge. Deer damage reports were investigated at a Christmas tree farm in Sterling.

Nuisance animal reports were addressed and recorded. Animal Reports were submitted electronically. Reports of suspected illegal activity were forwarded to the Environmental Police.
Several moose/vehicle collisions were documented and data collected from specimens which could be salvaged. Large animal responses were undertaken by District staff for moose or bear in cooperation with the Environmental Police. A white-tailed deer was immobilized by District and removed from an underground parking garage in Brookline.

Stewardship and Management -- 18 Wildlife Management Areas were maintained with efforts directed at fields, roads, parking lots, gates, dumping and ATV deterrents. Farm dumps were located and removed at the Quacumquasit and Muddy Brook WMAs. A dump site was cleaned at the Five Mile River Access with volunteer assistance provided by neighbors and the North Brookfield transfer station. Plans were initiated to create habitat management demonstration plots at the MacCallum WMA. Hazard trees were identified and removed at Merrill Ponds as they were determined to be a threat to an abutting home on Dewitt Road. The water level was lowered by 18 inches and maintained at the Cusky Pond dam in New Braintree following guidance provided by consulting engineers from Tighe & Bond.

An encroachment issue at the Thayer Pond WMA was investigated and the abutter notified that infrastructure placed on the WMA was to be removed. A time frame was established for the encroachment to be resolved. Improvements to a power line right of way at the Winchendon Springs WMA were completed by National Grid.

License Agreements were maintained with 18 central Massachusetts farmers, primarily for hay and corn. Agricultural fields were put out to bid at the Bolton Flats and Quaboag WMAs and subsequently awarded.

Dams--Work to repair the Burnshirt River Dam (Wine Brook) at the Phillipston WMA was completed in cooperation with the town and consulting engineers from the Office of Fishing and Boating Access and Tighe and Bond. The berm of the dam was graded and seeded and rip rap added to the spillway to improve structural integrity of the dam. Dam repairs were performed on the Town Farm Pond dam at Merrill Ponds WMA by T. Ford Company following engineering plans developed by Tighe & Bond. Spillways were cleared at the Thompson, Arnold, and Schoolhouse Pond dams.

Habitat Management and Monitoring-- Monitoring of tornado damage was continued by Habitat project leader John Scanlon at the McKinstry Brook WMA. A timber harvest and habitat management plan was undertaken at the Muddy Brook WMA in Hardwick to promote pitch pine barrens habitat. A habitat management project at the Pine Hill section of the Bolton Flats WMA was continued.

Fisheries

Pond surveys, using the District electrofishing boat, were conducted at Congamond Lake in Southwick, Lake Dennison in Winchendon, Eames Pond in Paxton, Lake Ripple in Grafton and Stoddard Pond in Winchendon. The Central District staff surveyed 34 sites on streams to assess fish populations and water conditions focusing on the Millers, Blackstone, Nashua, Quinebaug and Assabet river drainages. Baseline water quality data on acidity/alkalinity, conductivity and temperature were recorded. Hatchery raised trout were stocked in 36 ponds and lakes as well as 23 rivers and 27 streams in Central District. Stocking participants included Cub Scouts, school groups, Youth groups, New England Flytyers, Trout Unlimited and local sporting clubs. Landlocked salmon were stocked to supplement the existing population in the Wachusett Reservoir. Water flow devices were monitored on unnamed tributaries that flow into the Whitman River in Westminster in response to a proposed layover MBTA station at the Westminster Business Park. Wekepeke Brook in Lancaster was monitored following the removal of the Bartlett Pond dam. Native eastern brook trout were documented for the second successive year in the restored section of the brook. Slack Brook in Leominster was monitored in cooperation with the Army Corps of Engineers for the impact of a retaining wall on native brook trout. Lake trout sampling was conducted at Quabbin and Wachusett Reservoirs.

Natural Heritage and Endangered Species

District personnel assisted in the Bald Eagle Breeding Survey that was held in April. The Breeding Survey replaces the Midwinter Bald Eagle Survey. Resident nesting eagles were documented at Wachusett Reservoir, Pine Hill Reservoir, Quaboag Pond, Lake Shirley, Riverdale Pond and a beaver impoundment in Royalston. The bald eagle nesting territory at Wachusett Reservoir in Boylston was active but no incubation was observed. The Quaboag Pond eagle pair produced two chicks. The Lake Shirley territory produced two chicks. The pair at Pine Hill Reservoir in Paxton produced one chick. The successful eagle nesting at Webster Lake produced one chick that jumped from the nest before

the climber reached it. The bird fractured a femur and was rehabilitated at Tufts Wildlife Clinic in Grafton. It was subsequently banded and released at Wachusett Reservoir. There were 3 successful eagle nests on the east side of Quabbin Reservoir in Petersham and Hardwick that produced two chicks each. The nest in Royalston was rebuilt and the pair produced three chicks. The Northbridge nest at Riverdale Pond produced two chicks, one of which succumbed to unknown causes shortly after fledging. Kurt Palmateer of the McLaughlin Trout Hatchery climbed all nests where banding was undertaken.

Active osprey nests were documented at two sites in Sturbridge, both on cell towers. The known nests in Westboro, Auburn, Sterling and Grafton and Oxford were also active. The Westborough pair continued to use a nest pole installed by District staff. The nest on a cell tower in Templeton was active and produced two chicks. The nest pole installed by the Worcester Water Department at Quinapoxet Reservoir was unoccupied. A nest cam was installed by the town of Oxford at the nest at Greenbriar Park. One of two chicks succumbed in the nest and the second fledged successfully.

Peregrine falcons were present in downtown Worcester and failed due to a late season snowstorm. They again favored a ledge on the Bancroft Apartment building.

Bluebird, American kestrel, and other cavity nesting bird boxes were constructed and erected on WMAs. The bluebird nest box trail and sign were maintained at the High Ridge WMA. Kestrel boxes were monitored at Wachusett Reservoir, Bolton Flats WMA, MacCallum WMA and Moose Hill WMA as part of a program coordinated by State Ornithologist Drew Vitz.

Enhancement of Outdoor Recreation

Scheduling and stocking of Ring-necked Pheasants were completed and several thousand seven-week old pheasants were distributed to sportsmen's clubs and two correctional institutions for rearing. Pheasants were released on 17 WMAs, four town coverts, and participating club properties. Bolton Flats and Winimusset WMAs were available for the winter pheasant hunting opportunity in Central District. One application was received for Winimusset.
The District participated in Lands Committee and Parcel Ranking meetings. A summary of lands protected by fee acquisition or Conservation Easement is found in the Realty section of the Annual Report.

Public access sites were investigated with representatives from the Office of Fishing and Boating Access. Six boat ramps were visited and trash removed. Assistance was provided to the Office of Fishing and Boating Access as requested.

MA DOT hosted planning meetings for bridge reconstruction over the Quaboag River at the Quaboag WMA. Improvements for canoe and car top river access were completed.

Sixteen WMAs were maintained with efforts directed at fields, roads, parking lots, gates, dumping, and ATV deterrents.

Road repairs at the Little Chauncy Pond Fisherman's access were completed in cooperation with the Northboro Town Engineer and Conservation Commission.
Permitting and preliminary work to repair the Burnshirt River Dam (Wine Brook) at Phillipston WMA commenced in cooperation with the town and consulting engineers from the Office of Fishing and Boating Access and Tighe and Bond. The berm of the dam was cleared of vegetation and test borings conducted to determine the structural integrity of the dam.

Dam repairs were done on the Adams Pond Dam at the Merrill Ponds WMA by T. Ford Company with engineering oversight provided by Tighe and Bond. Engineering and permitting for similar work on the Town Farm Pond Dam were initiated by T&B with assistance from the Office of Fishing and Boating Access. Spillways were cleared at the Thompson, Arnold, and Schoolhouse Pond Dams.

The former Hunter Education building, barn, and bunker were demolished at High Ridge WMA under contract with Ramco Company.

New siding, windows, doors, and barn doors were installed at the Bolton Barn at Bolton Flats WMA.

License Agreements were maintained with 18 central Massachusetts farmers, primarily for hay and corn. Agricultural fields were put out to bid at High Ridge WMA and awarded. Six boat ramps were visited and trash removed. Assistance was provided to the Office of Fishing and Boating Access, as requested.

MA DOT hosted planning meetings for bridge reconstruction over the Quaboag River at Quaboag WMA. Improvements to river access were discussed. Issues with an abutting landowner have been addressed and the project has begun.

A boundary encroachment was resolved at the Wolf Swamp WMA. An illegal snowmobile bridge was removed from Birch Hill WMA by the snowmobile club responsible for its construction.

The District participated in Lands Committee and Parcel Ranking meetings. A summary of lands protected by fee

acquisition or Conservation Easement can be found in the Realty section of the Annual Report.

Outreach and Education

The Tags 'n Trout program was sponsored at Pratt Pond, Upton; Hopedale Pond, Hopedale; and Mill River, Blackstone. In June, the District participated in the 150th MassWildlife Anniversary Celebration at the Cronin Building in Westboro. A black bear program was given at the Dudley Land Trust Annual Meeting. The District participated in the creation of a promotional video with the I & E section entitled "I am a Hunter". The District Supervisor attended monthly meetings and provided updates to the Worcester County League of Sportsmen. Updates were printed in the Worcester County League News which goes out to member clubs.

Hunting, fishing, and trapping licenses, and antlerless deer, bear, and turkey permits were sold at the District headquarters.

Technical Assistance

The District Supervisor and staff interacted with other state and federal agencies, including NH Fish and Game; NGOs; and other groups, including DCR, DCR/DWSP, DEP, USFWS, USFWS Law Enforcement, Worcester County League of Sportsmen's Clubs, and multiple towns throughout Worcester County.

Technical assistance was provided for Animal Nuisance reports and site visits conducted where necessary. The majority of reports related to coyote, bear, fisher, bobcat and fox.

The 300-seedling chestnut orchard was maintained at the District in cooperation with the MA/RI Chapter of the American Chestnut Foundation and Department of Conservation and Recreation. The saplings were inoculated with chestnut blight to determine levels of blight resistance. Additional chestnut sprouts were maintained at the Winimusset WMA. Seedlings were produced at the MacCallum WMA chestnut orchard with mowing and irrigation assistance provided.

Surveillance cameras were used on multiple WMAs and images showing illegal activity were forwarded to the Environmental Police for investigation.

Connecticut Valley Wildlife District

Administration

The Valley District is at full staffing for the first time in two years with the hiring of a new Aquatic Biologist III Brian Keleher in March 2016. (David Basler, Aquatic Biologist III retired in August of 2015.) Brian comes to MassWildlife from Rensselaer Polytechnic Institute. After finishing his Master's Degree, he worked in Alaska and Washington State as an Aquatic Biologist before coming to MassWildlife.
Shasta Slade – Wildlife Technician II comes to the Valley District, transferring from the Sunderland Fish Hatchery in February 2016. Shasta has been with MassWildlife since June 2011and is a graduate of the University of Massachusetts.
All electronic issued licenses, permits, and tags are sold and tracked through the MassFishHunt System as of this year.
2,710 Quabbin One Day Fishing licenses were issued at the three boat launch area totaling $13,550.00.Four 4 Field Trial Permits were issued, one permit was issued for the Special Pheasant Hunt. 20 Swift River Camping Permits were issued.

The District Manger continues to serve as a CORE team member for the Silvio O. Conte National Fish and Wildlife Refuge (Conte Refuge), helping to define its Comprehensive Conservation Plan (CCP). The Draft CCP is now in its last phase. It has been through the public vetting process the Final CCP was rolled out to the public on December 16, 2016. The District Supervisor also serves as a member of the Mount Tom Partnership, along with The Trustees of Reservations, the Conte Refuge, the Holyoke Boys and Girls Club, and the DCR.

The Stewardship Biologist developed standardized maps for all district WMA/WCE properties and a priority list for marking boundaries on our WMA's. Four encroachment/trespass issues on the Montague Plains WMA were investigated and agreements for compliance are in place. Staff participated on a 6 acre controlled burn at Montague Plains WMA as part of the properties habitat restoration efforts.

Research and Conservation

Wildlife

Valley District staff completed Ruffed Grouse drumming routes and the Wild Turkey brood survey. Staff banded Canada Geese at nines sites. Ninety Wood Duck nesting boxes were checked and maintained at 20 sites. Bird and kestrel nesting boxes were maintained at several WMAs as well. Staff monitored the survival and reproduction of 14 radio-collared female black bears during the reporting period. Two 2-year-old collared females were hit and killed by vehicles. One collared female were harvested during the hunting season. Females were checked in their dens during February and March to determine reproductive success and first-year cub survival. GPS collars were affixed to bears to monitor locations every 45 minutes. This is a cooperative study with the University of Massachusetts at Amherst

(UMass/Amherst). The District assisted trapping 14 bears (10 males, 4 females) during the spring and summer of 2015 to increase the sample of GPS radio-collared females.
The District office is staffed to check all game species requiring reporting. In addition, the Valley has eight deer, seven turkey, three bear, and three furbearer checkstations throughout the District. District staff also staffed five biological deer checkstations during the first week of the shotgun deer hunting season.

The District Wildlife Biologist installed five remote cameras at Southwick WMA to monitor illegal off-road vehicle use. These cameras uploaded pictures to a website maintained by the District Supervisor. This website was made available to the OLE, which was able to use the photos to pattern illegal use and issue several citations. Also, seven large 18"x24" signs warning "Cameras in Use, OHVs Prohibited" were erected to help deter illegal OHVs.

Seven gates were installed at power line easements at Montague Plains WMA by the power company at the request of the District to help deter illegal trash dumping and OHVs. The gates and the open vistas created by the wildlife habitat improvement cuts have successively reduced illegal trash dumping. The upland habitat program improved over 250 acres of habitat at Montague Plains WMA by thinning a pitch pine dominated forest and maintaining an open grassland/shrubland understory.

All WMAs were posted with rules and regulations. These signs are posted at public access entrance points at 35 WMAs throughout the District. Newly acquired land parcels at Bushy Mt. WMA and Montague WMA were boundary marked.

Approximately 40 acres of fields were mowed at six WMAs (Southwick, Southampton, Herm Covey, Poland Brook, and Leyden). A controlled burn was conducted at Southwick WMA and Montague Plains. One and one quarter miles of access trails to four duck blinds were cleared for the annual Ludlow WMA controlled duck hunt.

The Stewardship Biologist completed seven WCE monitoring visits and completed a training to obtain the Prescribed Fire RT-130 Fire Safety Refresher certificate.

Wildlife Technician II Christopher Connors also completed the training for Prescribed Fire RT-130 Fire Refresher certificate.

Fisheries

The Fisheries Biologist position was vacant for the majority of this reporting period, Brian Keleher was hired in March of 2016 at the beginning of the spring trout stocking season.
Several stream surveys were completed in the summer of Fiscal Year 2015. Unfortunately the total sample for this year was somewhat reduced when compared to other years. Valley staff completed eight stream surveys across the district in the towns of: Conway, Whately, Northfield, Belchertown,

MassWildlife Fisheries staff sample a Coldwater Fish Resource with electroshock fishing equipment.

A MassWildlife biologist places a radio tracking collar on a sedated Black Bear.

New Salem, Shutesbury, Ware, and East Longmeadow. These surveys are used to investigate fish assemblages and designate cold water fisheries resources.
No major fish kills were reported in this fiscal year, although several were reported that were linked with natural mortality associated with spawning of anadromous species in the Connecticut River. Land Stewardship

District staff assisted for several nights on the Quabbin Lake Trout Project. Fish are captured in short-set gillnets, measured and then marked with individually identifying PIT tags to help assess growth.

Boundary marking has increased substantially this past year with staff and several contractors researching and marking in the field over 20 miles of WMA property lines in the district. This includes all or portions of the following properties, Bachelor Brook WMA, Brushy Mountain WMA, Palmer WMA, Poland Brook WMA, Montague Plains WMA, Honeypot WMA, Tully Mountain WMA, Mt Esther WMA, East Mountain WMA and Whately WMA. Well-marked boundaries not only help the public know where the perimeters of WMA property lines are, but they prevent encroachments and assure the public that we are taking care of our land. District staff also installed Safety Zone signs at various WMA's including Poland Brook WMA to ensure public safety of nearby abutters.

Annual monitoring visits and reports were conducted on 37 Wildlife Conservation Easements (WCE) in the district. Monitoring ensures that these private lands remain open for public access and that the terms of the easement are being upheld. It also provides opportunities for staff to discuss habitat management improvements with the landowner. Over 72% of WCE landowners were contacted with more than half being personal meetings with staff. Staff reviewed five forest stewardship/cutting plans and conducted site visits to three active forestry operations on WCE's to ensure compliance with the easement.

As the district continues to increase boundary marking on its WMA's there is an ever growing number of encroachments, dumping and illegal Off Road Vehicle (ORV) use that are discovered. Over 25 encroachments were documented on 13 different WMA's and two WCE's, with seven being on the Montague Plains WMA. Of these, 15 were cases of

dumping or encroachment of fences, lawns or buildings and 10 were ORV related. District staff has worked with abutters to remediate the encroachments with most of these cases being brought back into compliance but others are still under investigation or have been referred to the Massachusetts Environmental Police.

For each WMA in the district, new informational fact sheets were written for the MassWildlife Lands Viewer to help the public locate and learn about our WMA's using any. The MassWildlife Lands Viewer has been a great tool to help many new hunters find MassWildlife ands in their regions. Another digital system being utilized by staff is the Lands Information System (LIS) which is a web accessed database that stores all the agencies real estate information. This past year was used to upload district WCE information into LIS and to start using it to track WCE monitoring visits.
Staff conducted surveys for MESA listed plant and animal species on district WMA's to help update older records for the Natural Heritage and Endangered Species Program. Surveys were conducted on the Palmer WMA, Green River WMA, Pauchaug Brook WMA, and Bennett Meadows WMA. Staff also obtained a Commercial Pesticide Applicator License which is required to use herbicides for invasive species control on WMA's.

Natural Heritage and Endangered Species

The Valley District is monitoring 22 breeding Bald Eagle territories and banded eaglets in trees that could be safely climbed in the Valley District. District staff assisted in the spring eagle nesting survey, throughout the District.

Staff banded Peregrine Falcon chicks at the UMass/Amherst Library. Staff also constructed peregrine nesting boxes for NHESP staff to place at bridges throughout the District.

Staff assisted the NHESP install four artificial vernal pools at the Southwick WMA.

Enhancement of Outdoor Recreation

Staff stocked 10,000 pheasants on 33 town covers and 10 WMA covers prior to and during the 6-week pheasant hunting season.

Six sportsmen's clubs within the Valley District participated in the Club Pheasant Program; District staff distributed 1,496 seven week-old pheasants to these clubs in July.

District Staff administered a controlled waterfowl hunt at Ludlow WMA. Six hunters applied for permits and participated in the hunt.

Fall trout stocking in 2015 took place in early October, following very similar stocking patterns to years past. The Valley District stocked approximately 12,000 fish in water bodies that demonstrate high pressure and maintain suitable water levels and quality into autumn.

Between March and June the Valley District stocked 100 water bodies for the spring stocking season in Fiscal Year 2015. The extremely mild winter allowed for an early start in the second week of March, creating an opportunity for a gradually paced stocking season. 104,188 Trout were stocked into these waters; 29,615 Brown Trout, 23,035 Brook Trout, 50,988 Rainbow Trout and 550 Tiger Trout. As in previous years, several additional loads of trout, beyond the annual allocation, were stocked across the district due to the convenient location of the four hatcheries within the district (a total of 5,323 excess trout of varying sizes and species).

Three fishing derbies were supported by the Valley District this fiscal year: Piper Mill Pond (West Springfield), Dufresne Pond (Granby), and at the USFWS Open House (Hadley).

Outreach and Education

A small number of trout stocked into the Westfield River were tagged as part of the "Tags 'N Trout" program. These tags are sponsored by local sporting clubs and outdoor vendors. Anglers who catch tagged trout can redeem the tag for a prize from the sponsoring vendor. Fifteen tagged fish were stocked in the Valley District.

District Staff set up the MassWildlife display at the Franklin County Fair, staffed it over the fair's four days with help from FHQ staff, and provided river fish shocked at the Oxbow on the Connecticut River for the Fish and Game building's display tanks. District staff also provided a presence at the Springfield Sportsmen's Show in West Springfield, selling licenses, stamps, and permits and answering questions from visiting sportsmen.

The District Manager also gave a public speaking program: "The Bears of Massachusetts" for the Great Falls Discovery Center, in Turners Falls.

During the spring trout stocking season, the district participated in several special stocking events with local towns, schools and neighborhood groups. The Eagle Brook School, of Deerfield, visited for a spring fieldtrip to the McLaughlin Hatchery and to help stock the Swift River's Y-Pool with district Staff. Students learned about water ecology and had a chance to release some large Rainbow Trout into the Swift River.

The District Supervisor attended regular meetings of the

Hampden County Sportsmen's Council, the Hampshire County League of Sportsmen, and the Franklin County League of Sportsmen, where he gave presentations of interest to these groups. The District Supervisor and the District Biologists participated in various meetings with federal, state, and local agencies and land trusts, focusing primarily on land acquisition, management, and informational talks.

Technical Assistance

District staff fielded hundreds of calls requesting technical assistance for wildlife and fisheries concerns. Also, the needs of walk-in visitors were addressed, often including nuisance-animal complaints and requests for information. District personnel were often called upon to provide technical assistance to other agencies or user groups. Numerous injured hawks and owls were transported to rehabilitators. Additional field responses included assistance sought on behalf of deer, moose, and bear.

Western Wildlife District

Administration

The Western District underwent substantial staffing changes in FY16, reaching full staffing levels in February 2016 for the first time in two years.

Aquatic Biologist Dana Ohman left the Agency after 8 years of service to pursue other opportunities. Dana's contribution to Western District fisheries surveys and in-stream habitat projects were substantial.

The District was able to add new staff to fill the vacancies created by retirement and departures.

Nathan Buckhout was hired as the District Wildlife Biologist. Nate previously held the District Wildlife Biologist position in the Southeast Wildlife District.

Leanda Fontaine Gagnon came onboard as the District Aquatic Biologist. Leanda was previously employed as an Aquatic Biologist at the Field Headquarters in Westboro.
Derek McDermott was hired in February as a Wildlife Technician. Derek spent multiple years as a seasonal Fisheries Technician with MassWildlife.

Ray Bressette was hired as a Wildlife Technician. Ray is a recent graduate of Westfield State University who interned with MassWildlife.

The District Supervisor and the District Biologists provided input to the DFW Lands Committee on potential land acquisition projects, focusing on wildlife habitat and recreational opportunities. The District Stewardship Biologist and Wildlife Technicians monitored Conservation Easements throughout the District.

License agreements were issued by the District for agricultural leases on WMAs. The District currently manages 15 agreements. These agreements benefit wildlife by maintaining open habitats, often in places that would otherwise not be actively managed due to staff, equipment, and time constraints.

Staff participated in professional development and training including: Archery Instruction, Wildland Fire Training, SCUBA Dive Team Training, and Large Animal Response and Safe Capture Training.

Research and Conservation

Wildlife

Annual surveys for Woodcock, Ruffed Grouse, Mourning Doves, and waterfowl were conducted in cooperation with Wildlife Section biologists at FHQ. Staff also cleaned, constructed, and installed nest boxes for Wood Duck, bluebird, and kestrel.

Western District personnel provided support for Wildlife Project Leaders through game check stations, kill-card data entry, goose banding, and habitat work. Efforts to identify potential and historic New England Cottontail sites included collection of 53 samples across 4 sites in January and February 2016.

The District continued annual winter habitat projects on Wildlife Management Areas. In FY16 we focused those efforts on the Stafford Hill WMA, where previous efforts established field and young forest habitat. The District cleared orchard areas and pruned apple trees to make the area more productive for wildlife.

District technicians maintained open-field habitat through summer mowing on ten WMAs, spanning the majority of the district geography. These activities require a substantial investment of hours and equipment but are necessary to maintain biodiversity and recreational opportunity on DFW lands.

The District receives numerous calls about animals in distress warranting all levels of response. Among the animals handled by the District in FY16 were fawns, hawks, owls, loons, geese, eagles, turtles, and many species of small mammals. Outcomes of these cases included release, rehabilitation, or euthanization.

District staff provided support for project leaders on Common Loon assessments and nesting. Loon rafts were set on Cleveland Reservoir in Hinsdale and Buckley-Dunton Lake in Becket. Neither raft was successful in FY16. Loon nesting surveys were conducted on a number of waters in the District.

Fisheries

The District Fisheries program in FY16 included a transition in Fisheries Managers with a four month gap between. Despite this lack of continuity, the District accomplished many of our objectives.

Fish community assessments were conducted on 25 streams and 5 lake/pond sites in FY16. The Fisheries Manager (Ohman) oversaw habitat construction in the South River in Ashfield in cooperation with the Massachusetts Department of Transportation. She also continued participation in the Eastern Brook Trout Joint Venture.

The new Fisheries Manager (Fontaine Gagnon) began work in the Western District March 2016. She quickly adapted to the trout stocking process and schedule. In addition, she presented a paper on fisheries survey at the Northeast Fish and Wildlife Conference in Annapolis, Maryland.

The District Aquatic Biologist and technicians continued to monitor the presence of Didymosphenia geminata (a.k.a Didymo or Rock snot) in two river systems in the Western District.

District personnel provided support for the Fisheries Section by providing technical information, consulting on environmental review, responding to fish kills, and participating in meetings.

Stewardship

FY16 was the first full year with a dedicated Stewardship Biologist in the District. The Stewardship Biologist is responsible for coordinating efforts on boundary marking, encroachments, access, Conservation Easement monitoring, and other land management activities. The Stewardship Biologist was the point of contact for contractors working on boundary marking and surveys. A total of 52 miles of boundaries were marked in FY16, in combined efforts between district staff and contractors. Property surveys were conducted on two Western District WMAs. These surveys were done at sites where exact line location was unclear and abutters were encroaching.

The Stewardship Biologist coordinated 55 visits to Conservation Easements, including 32 official monitoring visits. The Biologist reviewed 3 forest cutting plans and 2 forest management plans for operations on Conservation Easements. He also worked with local historians to discover and restore a historic cemetery on a Western District WMA.

Natural Heritage and Endangered Species

District biologists provided support in the form of local knowledge and biological input to the NHESP on environmental reviews and listed-species issues.

District staff participated in the Bald Eagle Nesting Survey. Eagle Banding efforts were complicated by nest failures at four of the six Western District nest locations. An eagle chick was found beneath a fallen nest. The bird had sustained serious injuries from the fall but was successfully rehabilitated for later release.

District staff also conducted winter surveys for hibernating bats in three mines and seven caves. These surveys are a continuation of a long running effort to track use in Massachusetts hibernacula, particularly important given the presence of White Nosed Syndrome in the Commonwealth.

The Stewardship Biologist and Wildlife Biologist worked with the NHESP program to look for rare plants in locations with historical records on MassWildlife property, documenting 3 occurrences.

District Biologists and Wildlife Technicians partnered with NHESP to manage and enhance habitat for endangered bog turtles by conducting surveys, clearing habitat, maintaining water levels, and assisting in the management of beneficial grazing.

Enhancement of Outdoor Recreation

Enhancement of outdoor recreation is a core function of the District office. Trout were stocked into 24 lakes and ponds and 56 streams and rivers to enhance recreational fishing. Where possible, we partnered with school groups or other interested organizations such as Trout Unlimited on stocking sites. Staff maintained open areas on five WMAs where pheasants are stocked. District staff released 4,000 pheasants onto 14 areas (including WMAs and local covers). These areas represent the best available opportunities for pheasant hunting and cover all regions of the District. Pheasant chicks were provided to the Lee and Ashfield sportsmen's clubs. District Wildlife Technicians constructed and installed signs and maintained parking areas and access for the public. Three boat access sites managed by the DFW were maintained by District Wildlife Technicians.

District Staff installed 2 gates and constructed a new park-

ing area at the Swift River WMA.

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.

Outreach and Education

District field staff interacts with the public on a daily basis, providing information and sharing enthusiasm for outdoor activities. In addition, Western District staff also participated in more formal events focused on educating the public about the agency and the environment, including the Springfield Sportsmen's Show. We continued to develop relationships with the schools adjacent to our headquarters in Dalton, making informational presentations to both middle and high school students and participating in the high school internship program.

The District Supervisor attended monthly meetings and provided updates to the Berkshire County League of Sportsmen and to the Hampshire County League of Sportsmen's Clubs when the meetings occurred in the Western District.

The District Manager and the District Wildlife Biologist both presented lectures as part of the Green Living Seminar Series at the Massachusetts College of Liberal Arts (MCLA). The District also hosted students from MCLA as part of a service learning project.

The District Manager presented at the inaugural Berkshire Natural History Conference. He also held presentations for Gateway High School, Wahconah High School and Project Wild at the Student Conservation Association.

The District helped organize an event celebrating the presentation of the Francis Sargent Conservation Award to the Berkshire Natural Resource Council for their efforts in protecting wildlife habitat and the interest of users.
Technical Assistance

The District Clerk fielded hundreds of calls requesting technical assistance. District personnel responded to these inquiries with professionalism and expertise. The Clerk also addressed the needs of walk-in visitors and issued permits and licenses to hundreds of sportsmen. In addition to advising members of the public, District personnel were often called upon to provide technical assistance to other agencies or user groups.

Black bear management continued to be a major activity for District staff during the spring and summer months. Calls requesting assistance, information, or simply reporting activities were an almost daily occurrence. District personnel responded with a tiered approach ranging from over the phone advice to site visits and active response.

Large Animal Response cases included multiple calls involving moose, deer and bear. Four black bear were immobilized and relocated from urban settings.

The District Supervisor represented the agency at meetings involving resource conservation in the region. He continued as the alternate state representative to the Westfield Wild and Scenic River Committee.

The Berkshire Natural Resources Council received the Francis W. Sargent Conservation Award from the Massachusetts Fisheries and Wildlife Board for its conservation of the Commonwealth's natural resources and for its contributions to the sporting community.

District Personnel

Northeast Wildlife District

Patricia Huckery, District Supervisor
David Critchlow, Wildlife Technician
Robert Desrosiers, Wildlife Technician
Travis Drudi, Wildlife Technician
Anne Gagnon, Land Agent (DFG)
Sue Ostertag, Clerk
John Sheedy, Fisheries Manager

Southeast District

Jason E. Zimmer, District Supervisor
Aaron Best, Wildlife Technician
Jeff Breton, Wildlife Technician
Daniel Fortier, Wildlife Technician
John Garofoli, Wildlife Technician
Steve Hurley, Fisheries Manager
Joan Pierce, Land Agent (DFG)
Debra Silva, Clerk
Steve Wright, Wildlife Manager

Central Wildlife District

Bill Davis, District Supervisor
Mark Brideau, Fisheries Biologist
Mike Morelly, Wildlife Biologist
Scott Kemp, Stewardship Biologist
Debra Manty, Clerk
John Bonafini, Technician
Jessi Manty, Technician
James McCarthy, Land Agent (DFG)
Ethan LaPlante, Technician
Bruce Walker, Technician

Connecticut Valley Wildlife District

Ralph Taylor, District Supervisor
Brian Keleher, Fisheries Manager
David Fuller, Wildlife Manager
Tom Wansleben, Stewardship Biologist
Barbara Bourque, Clerk
Christina Petersen, Land Agent (DFG)
Kevin Pelosky, Wildlife Technician
Walter Tynan, Wildlife Technician
Christopher Connors, Wildlife Technician
Shasta Slade, Wildlife Technician

Western Wildlife District

Andrew Madden, District Supervisor
Derek McDermott, Wildlife Technician
Ray Bressette, Wildlife Technician
Tammy Ciesla, Wildlife Technician
Nancy Dewkett, Wildlife Technician
Nathan Buckhout, Wildlife Manager
Debra Lipa, Clerk
Peter Milanesi, Land Agent (DFG)
Jacob Morris-Siegel, Land Stewardship Biologist
Leanda Fontaine Gagnon, Fisheries Manager

Wildlife Lands
Acquisition and Realty Stewardship

Craig A. MacDonnell
Chief of Wildlife Lands

Overview

The Realty Section had an impressive fiscal year 2016 (FY16) in terms of both acquisition and stewardship. As summarized below, FY16 saw the protection of 1,929 acres of land, many miles of boundary maintenance, eleven important survey projects, and invigorated easement monitoring.

Land Acquisition

The mission of the Land Protection Program, a joint effort of the Department of Fish and Game (DFG) and the Division of Fisheries and Wildlife (MassWildlife), is to protect the ecological integrity of the Commonwealth and provide wildlife-related recreational opportunities to the public. Each year the Land Protection Program seeks to expand existing wildlife lands, enhance public access to lands and waters open to sporting activity, and protect key habitats. Most of the funding for land acquisition is from bond capital, with the remaining portion provided by the Wildlands Stamp Fund, a $5 fee added to each hunting, fishing, and trapping license sale.

Fiscal Year 2016 was a very strong year for land protection, with land agents completing 48 projects conserving 1,929 acres of valuable wildlife habitat at a cost of $4.9 million. The majority of lands and easements were purchased, although over 400 acres were donated.

Wildlife Management Areas (WMA) and Wildlife Conservation Easements (WCE) are open to fishing, hunting, trapping, wildlife observation, and other passive wildlife-related recreation. These wildlife lands, from the Berkshires to the Cape and Islands, include river corridors, wetlands, forested and grassy uplands, habitat for state-listed endangered and threatened species, and high quality parcels of other important habitats.

In the Western District, 14 acquisitions were completed in FY16 protecting a total of 690 acres at a cost of $1,121,080. In a far reaching effort, MassWildlife was involved in a complex transaction protecting a popular recreation area, the Boulders Reserve, located in the Pittsfield area. MassWildlife has held a conservation easement (Boulders WCE) on this large 624-acre recreation area with longtime owner, Crane and Co. MassWildlife partnered with the Berkshires Natural Resource Council (BNRC) who was gifted the parcel by Crane and Co., while MassWildlife kept the easement. A conservation easement from three additional parcels of land totaling nearly 50 acres was purchased by MassWildlife, adding to the Reserve and WCE holding. Finally, 41 acres of the original Boulders WCE abutting the Chalet WMA off Gulf Road was gifted by BNRC to MassWildlife in fee, allowing us to make it part of the WMA.

Eight projects were concluded in the Connecticut Valley District protecting 263 acres at a cost of $375,000. The most exciting project in this district was the once-in-a-generation addition of 93 acres of valuable and very developable habitat to the Montague Plains WMA. The Emond family conveyed this large parcel abutting the western side of the WMA after many years of negotiation.

Central District staff completed 11 acquisitions protecting 432 acres at a cost of $1,115,920. In a project involving the sporting community, MassWildlife purchased a conservation easement protecting 100 acres of key habitat owned by the Worcester County League of Sportsmen and adjacent to the Winimusset WMA in New Braintree. The League offered the easement at a generous discount that was fully funded by the Wildlands Stamp Fund. Looking to the future, the League agreed to MassWildlife retaining right-of-first-refusal to purchase the land should the League decide to sell.

In the Northeast District, land staff completed 10 projects conserving 283 acres of land at a cost of $848,000. Of particular note in the Northeast was a coordinated property assemblage in Townsend, where three parcels comprising 100 acres were acquired for addition to the Squannacook River WMA.

Five land conservation projects were executed in the Southeast District involving a total of 260 acres at a cost of $1,531,000. After over 20 years of effort, a significant 27-acre purchase which included road frontage will provide vastly improved public access to the 3,000 acre Haskell Wildlife Management Area in Mattapoisett.

The 1,929 acres conserved across the Commonwealth in FY16 bring the total acreage to over 208,000 acres, which

	Western	Valley	Central	Northeast	Southeast	TOTAL
WMA	45,643	18,645	37,233	13,548	42,436	**157,505**
WCE	15,648	8,389	8,736	2,085	10,728	**45,586**
Access	35	512	682	234	55	**1,519**
Sanctuary	435	0	368	552	73	**1,428**
WCR	69	2	746	127	38	**983**
Installation	2	436	0	108	114	**660**
Other	0	143	0	372	0	**515**
TOTAL	**61,832**	**28,127**	**47,767**	**17,026**	**53,444**	**208,197**

is over 325 square miles of permanently protected wildlife habitat. These lands were conserved with your help and are for your enjoyment. Start planning your next outdoor adventure, visit mass.gov/dfw/wildlife-lands to view maps of wildlife lands.

Stewardship Activities

Boundaries

DFW engaged the services of five experienced contractors in FY16 for the purpose of confirming property boundaries at various WMAs and WCEs in each of the five Wildlife Districts. All of the Districts reported excellent progress on this much-needed project, with some variation in accomplishment depending on location and parcel configuration. Boundaries on larger parcels with less intricate boundaries typically were easier to confirm. Staff provided our contractors with maps and deeds together with basic orientation. Our contractors performed a diverse set of tasks depending on district preference, including researching deeds, locating boundaries in the field, creating GPS track-logs, blazing and painting trees, and hanging DFW signage.

Surveys

DFW also hired four private survey contractors to help resolve a large number of challenging boundary questions that have arisen in the Districts. Land Agents, Stewardship Biologists, and District Managers worked closely with these contractors, who prepared survey plans and set boundary markers at eleven different properties, including several in each of the Districts.

Conservation Restriction Baseline Documentation and Monitoring Efforts

Contractors completed an additional four Baseline Documentation Reports on Conservation Restrictions. Approximately 160 CR monitoring visits were conducted by District and Field Headquarters staff, and reports were submitted to USFW and Forest Legacy Program as required.

Forest products harvesting continues to be the most common activity that requires review and approval on CR properties by agency staff. This review is provided by a team of staff members, including Forestry Project staff in the Wildlife Section, Realty Staff in Westborough, and Stewardship Biologists in the Districts. The reviews offer opportunities to track and positively influence forestry activities with respect to agency goals. The Realty Section provides oversight and coordination of all monitoring efforts.

Grafton Land Trust (GLT) Vice President Troy Gipps and MassWildlife Stewardship Associate Elizabeth Newlands conducting a conservation restriction (CR) monitoring visit on the GLT's Potter Hill Meadows and George Knowlton Preserve properties in Grafton.

Row Labels	Sum of Report Acres
Central District	**47767.175**
ACCESS	**683.37**
Bare Hill Pond Access	1.45
Blackstone / West River Access	28
Cusky Pond Access	23
Five Mile River Access	178.52
Glen Echo Lake Access	1
Leadmine Pond Access	0.05
Moose Brook Access	20.13
Mossy Pond Access	17
Natty Brook Access	95.17
Quag Pond Bog Access	31
Quinapoxet River Access	32
Quinsigamond Marsh Access	59
Quinsigamond River Access	18.6
Sevenmile River Access	77
South Meadow Pond Access	0.25
Sputtermill Pond Access	58.5
Tully River Access	1
Ware River Access - Barre	40
Webster Lake Access	1.7
Sanctuary	**367.91**
Mount Watatic Sanctuary	228
Susan B. Minns Sanctuary	139.91
WCE	**8736**
Benjamin Hill WCE	87.5
Breakneck Brook WCE	526
Burnshirt River WCE	100
Carter Pond WCE	300.5
Fish Brook WCE	75
Fitchburg Watershed WCE	1875
Hitchcock Mountain WCE	110.5
Lawrence Brook WCE	462.6
Leadmine Mountain WCE	826.37
Long Pond WCE	8.85
McKinstry Brook WCE	31
Millers River WCE	204.72
Moose Brook WCE	125
Mt. Pisgah WCE	19.12
Muddy Brook WCE	575.69
Newton Reservoir WCE	622
Nineteenth Hill WCE	623.75
Potter Hill WCE	90.8
Quisset WCE	247
Savage Hill WCE	234
Secret Lake WCE	311.3
Slater Woods WCE	73.9
Stuart Pond WCE	28.7
Taft Hill WCE	394.6
Wekepeke WCE	564
Whitmanville WCE	118.1
Winimusset WCE	100
WCR	**746.41**
Breakneck Brook WCR	176
Five Mile River WCR	17.27
Hitchcock Mountain WCR	499.5
McKinstry Brook WCR	26
Raccoon Hill WCR	22
Williamsville Pond WCR	5.64
WMA	**37233.485**
Bennett WMA	281.2
Birch Hill WMA	4550.75
Bolton Flats WMA	1319.88
Breakneck Brook WMA	707
Chockalog Swamp WMA	52.5
Clinton Bluff WMA	42
Coy Hill WMA	865.8
E. Kent Swift WMA	157
Fish Brook WMA	142.5
Four Chimneys WMA	200
High Ridge WMA	2240.87
Hitchcock Mountain WMA	268.41
Lackey Pond WMA	174.54
Lawrence Brook WMA	295.5
Leadmine WMA	826
Long Pond WMA	5.6
Martha Deering WMA	232.58
McKinstry Brook WMA	291.3

Merrill Pond WMA	1002.66
Millers River WMA	3685.72
Mine Brook WMA	1062.15
Moose Brook WMA	849.195
Moose Hill WMA	640.1
Mt. Pisgah WMA	88.8
Muddy Brook WMA	1774.92
Oakham WMA	742.2
Phillipston WMA	3222.03
Popple Camp WMA	1459.91
Poutwater Pond WMA	391.74
Prince River WMA	748.95
Quaboag WMA	1242.42
Quacumquasit WMA	179.82
Quisset WMA	424.69
Raccoon Hill WMA	646.16
Richardson WMA	467.22
Savage Hill WMA	930.96
Scripture Hill WMA	121
Stone Bridge WMA	505.17
Sucker Brook WMA	102.6
Thayer Pond WMA	131
Ware River WMA	185.36
Wayne F. MacCallum WMA	894.58
West Hill WMA	
Whortleberry Hill WMA	324.4
Winchendon Springs WMA	853.8
Winimusset WMA	670.17
Wolf Swamp WMA	1232.33
Connecticut Valley District	**28127.41**
ACCESS	**511.82**
Connecticut River Access	94.8
Deerfield River Access	21
Lake Lorraine Access	0.26
Lake Rohunta Access	2.49
Little Alum Pond Access	0.5
Mill River Access	14.15
Millers River Access	52.8
Packard Pond Access	0.54
Sawmill River Access	52
Tully Brook Access	154.88
Ware River Access	39
Westfield River Access	79.4
Installation	**436.13**
Bitzer Fish Hatchery	74.54
Reed Fish Hatchery	316
Sunderland Fish Hatchery	45.59
Other	143.09
Wilbraham Nature and Cultural Center	143.09
WCE	**8388.7**
Amythyst Brook WCE	36.9
Brushy Mountain WCE	78
Chestnut Hill WCE	175.4
Facing Rock WCE	190
Great Swamp WCE	0.94
Honey Pot WCE	52.74
Lake Rohunta WCE	59
Little Tully Mountain WCE	461.38
Ludlow Reservoir WCE	1750
Orange WCE	877.97
Paul C. Jones Working Forest WCE	3486
Satan's Kingdom WCE	527.5
Tully Mountain WCE	692.87
WCR	**2.39**
Wendell WCR	2.39
WMA	**18645.28**
Bachelor Brook WMA	93.7
Bennett Meadows WMA	
Brewer Brook WMA	213.99
Brushy Mountain WMA	85.44
Catamount WMA	413
Darwin Scott WMA	27.3
East Mountain WMA	480.86
Facing Rock WMA	1366.1
Flagg Mountain WMA	160.48
Great Swamp WMA	689.33
Green River WMA (Valley District)	381.95

Herman Covey WMA	1492.98
Honey Pot WMA	178.42
Lake Warner WMA	98
Leyden WMA	759
Montague Plains WMA	1744.1
Montague WMA	1811.44
Mt. Esther WMA	328.95
Mt. Toby WMA	688.1
Mt. Tom WMA	79.9
Orange WMA	374.1
Palmer WMA	1298.24
Pauchaug Brook WMA	161.3
Poland Brook WMA	707.53
Satan's Kingdom WMA	1774.79
Shattuck Brook WMA	178.8
Shepherd's Island WMA	45.9
Southampton WMA	170.6
Southwick WMA	265.24
Sunderland Islands WMA	15
Tully Mountain WMA	704
Wales WMA	207.15
Warwick WMA	379
Wendell WMA	591.19
Westfield WMA	234.03
Whately WMA	357.37
Williamsburg WMA	88
Northeast District	**17026.48**
ACCESS	**234.19**
Baddacook Pond Access	0.16
Flint Pond Access	89
Ipswich River Access	1.79
Knops Pond Access	0.6
Lake Attitash Access	6.03
Long Sought For Pond Access	1
Mascuppic Lake Access	0.25
Nashua River Access - Dunstable	15
Nashua River Access - Groton	10.1
Nashua River Access - Pepperell	11.2
Nashua River Access - Shirley	30.7
Sudbury River Access	51.86
Weymouth Back River Access	16.5
Installation	**107.82**
Acton Installation	1.4
Ayer Game Farm	90.72
Northeast District HQ	15.7
Other	**371.95**
Gov. Thos. Dudley Park	4.75
King Phillip Woods	87.2
Mount Watatic Reservation	280
Sanctuary	**552.48**
Carr Island Sanctuary	110.5
Henry Cabot Lodge Bird Sanctuary (Egg Rock)	2
J. C. Phillips Sanctuary	390.98
Milk Island Sanctuary	29
Ram Island Sanctuary (North)	20
WCE	**2084.96**
Concord River WCE	18.9
Cow Pond Brook WCE	127
Devil's Den WCE	28
Great Meadows WCE	16
Great Swamp Brook WCE	106
Groton Town Forest WCE	513
Hunting Hills WCE	84.59
Martin H. Burns WCE	113.44
Meadow Pond WCE	58
Pepperell Springs WCE	255
Squannacook River WCE	257.83
Sucker Brook WCE	12
Surrenden Farm West WCE	169.7
Throne Hill WCE	177.5
Wright Pond WCE	148
WCR	**127**
Mill Creek WCR	59
Squannacook River WCR	68
WMA	**13548.08**

Ashby WMA	946.76
Boxborough Station WMA	124.1
Crane Pond WMA	2605.21
Dunstable Brook WMA	141.6
Eagle Island WMA	5
Elbow Meadow WMA	210.33
Fessenden Hill WMA	21
Flagg Swamp WMA	54
Great Marsh North WMA	230.17
Hauk Swamp WMA	61
Hunting Hills WMA	430.02
Martin H. Burns WMA	1576.7
Mulpus Brook WMA	469.05
Nissitissit River WMA	404.26
North Shore Salt Marsh WMA	221.75
Pantry Brook WMA	449.95
Salisbury Salt Marsh WMA	770.07
Squannacook River WMA	1594.2
Townsend Hill WMA	542.08
Trapfall Brook WMA	45.38
Unkety Brook WMA	519.81
Upper Parker River WMA	171
Whittier WMA	36
William Forward WMA	1918.64
Southeast District	**53443.54**
ACCESS	**54.65**
Agawam Mill Pond Access	1.4
Agawam Mill Pond Access WCE	0.5
Bakers Pond Access	1.75
Barnstable Harbor Access	2.78
Big Sandy Pond Access	0.2
Childs River Access	0.25
Cook Pond Access	3
Dogfish Bar Beach Access	2.4
Great Herring Pond Access	1.06
Johns Pond Access	0.52

Mashpee-Wakeby Pond Access	25
Nemasket River Access	0.46
Popponesset Beach Access	1.5
Robbins Pond Access	1
Scorton Creek Access	5.48
Shubael Pond Access	0.35
Snipatuit Pond Access	0.5
Spectacle Pond Access	0.5
Tispaquin Pond Access	6
Installation	**114.36**
Lobster Hatchery	14.8
Sandwich Fish Hatchery	69.76
Southeast District HQ	29.8
Sanctuary	**73**
Billingsgate Island Sanctuary	6.5
Penikese Island Sanctuary	60
Ram Island Sanctuary (South)	2
Tarpaulin Cove Sanctuary	4.5
WCE	**10727.8**
Acushnet River WCE	30.2
Agawam River WCE	3.98
Angeline Brook WCE	100.7
Assawompsett Pond Complex WCE	3065
Bettys Neck WCE	329.22
Billington Sea WCE	69.74
Brandt Island Cove WCE	109.52
Bread and Cheese Brook WCE	5.52
Camp Cachelot WCE	789
Halfway Pond WCE	28
Lake Nippenicket WCE	8.35
Maple Springs WCE	101.63
Pickerel Cove WCE	78.3
Pilgrim Springs WCE	17.05
Plymouth Pine Hill WCE	240.7
Plymouth Town Forest WCE	296

Poor Meadow Brook WCE	101
Quashnet River WCE	14.1
Santuit Pond WCE	293
Sippican Woods WCE	390.14
South Triangle Pond WCE	47.5
Stump Brook Reservoir WCE	174
Taunton River WCE	125.07
Watuppa Reservation WCE	4300
Weweantic River WCE	10.08
WCR	**37.9**
Plymouth Grassy Pond WCR	33.9
Taunton River WCR	4
WMA	**42435.83**
Bearse Pond WMA	5.8
Black Brook WMA	411.32
Blueberry Pond WMA	1.5
Brayton Point WMA	2.2
Burrage Pond WMA	1817.43
Camp Edwards WMA	15013.16
Canoe River WMA	116.6
Chase Garden Creek WMA	56.4
Church Homestead WMA	163
Clapps Pond WMA	68.35
Cooks Pond WMA	69.18
Copicut WMA	3992.56
Dartmoor Farm WMA	473
Dennis Grassy Pond WMA	7.24
Eastham Salt Marsh WMA	7.44
English Salt Marsh WMA	288.5
Erwin S. Wilder WMA	581.45
Fisk Forestdale WMA	235
Fox Island WMA	71.1
Frances A. Crane WMA	2165.31
Freetown Swamp WMA	584.52
Gosnold WMA	3.45
Halfway Pond WMA	122.64

Hartley Reservoir WMA	70
Haskell Swamp WMA	3111.22
Head Of The Plains WMA	2
Hockomock Swamp WMA	4498.94
Hog Ponds WMA	24.5
Hyannis Ponds WMA	365
Katama Plains WMA	18.57
Maple Springs WMA	689.55
Mashpee Pine Barrens WMA	198.35
Mashpee River WMA	55.8
Meetinghouse Swamp WMA	123
Miacomet Heath WMA	3.83
Muddy Pond WMA	72
Noquochoke WMA	204.5
North Attleborough WMA	36.46
Old Sandwich Game Farm WMA	93.13
Olivers Pond WMA	12
Peterson Swamp WMA	250
Pickerel Cove WMA	15.9
Plymouth Grassy Pond WMA	25.5
Poor Meadow Brook WMA	161.61
Provincetown Corridor WMA	122
Purchade Brook WMA	106
Quashnet River WMA	79.54
Quashnet Woods State Reservation & WMA	360
Red Brook WMA	683.2
Rocky Gutter WMA	3143.89
Sandwich Hollows WMA	224.2
SE Pine Barrens WMA	436.84
Sly Pond WMA	192
South Shore Marshes WMA	22.4
Taunton River WMA	353.27
Triangle Pond WMA	92.16

Wasque Point WMA	99.5
West Meadows WMA	231.82
Western District	**61832.892**
ACCESS	**35.2**
Hoosic River Access	5.9
Housatonic River Access	17
Konkapot River Access	8.8
Westfield River Access - Chester	3.5
Installation	**2.35**
Western District - Old HQ	2.35
Sanctuary	**435**
E. Howe Forbush Sanctuary	365.5
Grace A. Robson Sanctuary	69.5
WCE	**15647.982**
Abbott Brook WCE	1782
Alford Spring WCE	889.82
Allen Mountain WCE	208
Boulders WCE	642.532
Cold Brook WCE	405
Cole Meadow WCE	101
Flag Rock WCE	41.38
Hawks Brook WCE	23.19
Housatonic River East Branch WCE	100
Jug End Fen WCE	81.57
Jug End WCE	262.48
Knightville WCE	676
Mt. Darby WCE	319.29
Mt. Plantain WCE	1337.44
North Egremont WCE	21.5
North River West Branch WCE	96.2
Rockhouse Mountain WCE	78
Scout Pond WCE	175.9
Shales Brook WCE	5.6
Silver Brook WCE	162
Stage Brook WCE	581
Steadman Pond WCE	1170.95
Thorpe Brook WCE	266.2
Tower Brook WCE	300
Umpachene River WCE	239
Upper Westfield River WCE	12.5
Westfield Watershed WCE	2300
Widow White's Peak WCE	85
Windsor Brook WCE	3284.43
WCR	**69.4**
Windsor Brook WCR	69.4
WMA	**45642.96**
Abbott Brook WMA	18
Agawam Lake WMA	785.75
Ashfield Hawley WMA	284
Barton's Ledge WMA	88.6
Bullock Ledge WMA	15.5
Chalet WMA	7475.26
Cummington WMA	288.97
Day Mountain WMA	382.45
Dolomite Ledges WMA	319.85
Eugene D. Moran WMA	1669.92
Fairfield Brook WMA	164.9
Farmington River WMA	1848.6
Fisk Meadows WMA	640.17
Flat Brook WMA	273.15
Fox Den WMA	4975.48
George L. Darey Housatonic Valley WMA	812.93
Green River WMA (Western District)	489.12
Hawks Brook WMA	509.83
Hinsdale Flats WMA	1852.77
Hiram H. Fox WMA	3754.19
Hop Brook WMA	424.8
Housatonic River East Branch WMA	27.5
Hubbard Brook WMA	195.93
John J. Kelly WMA	267
Jug End Fen WMA	53.54
Jug End State Reservation and WMA	1169.8
Jug End WMA	20

Kampoosa Fen WMA	72
Knightville Dam WMA	0
Lilly Pond WMA	350.7
Long Mountain WMA	906
Maple Hill WMA	578.05
Maxwell Brook WMA	36.4
Misery Mountain WMA	740.4
North Egremont WMA	25.96
Oak Hill WMA	712.3
Peru WMA	4883.1
Powell Brook WMA	404.58
Ram Hill WMA	408.25
Richmond Fen WMA	22.9
Savoy WMA	1883.34
Shales Brook WMA	234

Shaw Brook WMA	153.33
Stafford Hill WMA	904.6
Stage Brook WMA	148.3
Swift River WMA	291.73
Tekoa Mountain WMA	1383.3
Three Mile Pond WMA	1141.82
Tracy Pond WMA	225.07
Upper Westfield River WMA	310.32
Walnut Hill WMA	983.5
Williams River WMA	35
Grand Total	**208197.497**

Muddy Brook WMA in Hardwick.

Federal Aid

Mike Sawyers
Federal Aid Coordinator

Overview

The Federal Aid Coordinator, acting through the Deputy Director, 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, as well as serving as liaison between the grantee and the Region 5 office of the U.S. Fish and Wildlife Service (USFWS) grant administrator for the U.S. Department of the Interior.

Federal Aid in Wildlife Restoration (Pittman-Robertson)

MassWildlife's apportionment of Federal Aid in Wildlife Restoration funds, $6,740,034, was a decrease 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, land acquisition, and program coordination.

Federal Aid in Sport Fish Restoration (Dingell-Johnson and Wallop-Breaux)

The State's Federal Aid in Sport Fish Restoration Act apportionment of $3,610,771 represents an increase over 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 $541,616 (15%); and the balance of $3,069,155 was equally divided between the Division of Marine Fisheries and MassWildlife ($1,534,578 each).

Four projects were obligated with the OFBA and MassWildlife shares of the FY 16 Dingell-Johnson and Wallop-Breaux funds. The OFBA, in cooperation with MassWildlife, had thirteen boat accommodation grants active in FY 16. MassWildlife activities reimbursed under the Sport Fish Restoration Program include aquatic resources education, program coordination, hatchery operations, hatchery maintenance, fish distribution, and anadromous fish coordination and technical assistance.

State Wildlife Grant Program (SWG)

MassWildlife's State Wildlife Grant apportionment of $726,658 was an increase from the previous year. The SWG funds were applied to six 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 development and implementation of the Massachusetts State Wildlife Action Plan.

Through a regional effort, New Hampshire, Connecticut, New York, Maine, and Massachusetts were awarded a total of $3,000,000 through the FY 10, FY 11, FY 13, and FY 14 national State Wildlife Grant competitive programs to implement the Rangewide New England Cottontail (NEC) Initiative. Massachusetts' share of the funds ($723,475) will be used to restore NEC habitat in Massachusetts. Implementation of the NEC Initiative will continue through FY 18.

MassWildlife was awarded $58,000 through the FY 11 national State Wildlife Grant competitive program to fund the Northeast Blanding's Turtle Initiative. MassWildlife is partnering with the states of Maine, New Hampshire, Pennsylvania, and New York. This cooperative project was completed in FY 16. New Hampshire served as the lead state on a second proposal for Blanding's Turtle which was selected for funding during FY 16. Implementation of the second Blanding's Turtle grant will begin in FY 17.

MassWildlife was also awarded $277,719 through the FY 13 national State Wildlife Grant competitive program to fund the Conservation of Snake Species Threatened by an Emerging Fungal Skin Disease. MassWildlife is partnering with New Hampshire, Connecticut, Vermont, New Jersey, Tennessee, Minnesota, Wisconsin, and Illinois to address this nationally important conservation issue. This cooperative project will continue through FY 18.

MassWildlife served as the lead state and was awarded $269,955 through the FY 14 national State Wildlife Grant Competitive program to fund Conservation Planning and Implementation for the Wood Turtle. MassWildlife is partnering with Maine, New Hampshire, Connecticut, Pennsylvania, New Jersey, Maryland, and Virginia. This cooperative project will continue through FY 18.

MassWildlife was awarded $20,000 through the FY 15 national State Wildlife Grant competitive program to fund the Multistate Recovery Actions for the Bog Turtle and Associated Headwater Wetland Species of Greatest Conservation Need. MassWildlife is partnering with Pennsylvania, Maryland, New Jersey, and Connecticut. This cooperative project will continue through FY 18.

MassWildlife served as the lead state and was awarded $402,545 through the FY 16 national State Wildlife Grant Competitive program to fund the Brook Floater Rangewide Conservation and Restoration Initiative. MassWildlife is partnering with the states of Maine, New Hampshire, and Virginia. This cooperative project will begin in FY 17.

The Endangered Species Act (Section 6)

MassWildlife's apportionment of $81,000 was an increase over the previous year apportionment. Funds will be used to reimburse the Federally-listed Plant Monitoring and Management project, the Piping Plover Piping Plover Monitoring, Management, and Research project, and Northern Red-bellied Cooter Adaptive Management.

During FY 14, a funding opportunity for White-nose Syndrome was awarded to MassWildlife in the amount of $52,500. This grant was extended into FY 16 and subsequently completed. Another round of White-nose Syndrome funding was awarded to MassWildlife during FY 16 in the amount of $31,200. Implementation of these funds will occur in FY 17.

During FY 14, MassWildlife was awarded $188,694 under the Section 6 Habitat Conservation Planning (HCP) Grant Opportunity which will increase and expand the long-term conservation of Piping Plover in Massachusetts through partnerships with municipalities and local conservation partners. Implementation of the HCP continued through FY 16.

North American Wetlands Conservation Act (NAWCA)
During FY 15, the MassWildlife was awarded $720,002 under the North American Wetlands Conservation Act for a proposal to fund wetland protection, restoration, and enhancement in the Great Marsh in Essex County. MassWildlife has established partnerships with other state agencies, municipalities, conservation organizations, and private individuals to accomplish the goals of the project. Project implementation will continue through FY 18.

Monarch Butterfly Conservation Fund

During FY 16, MassWildlife was awarded $21,500 under the Monarch Butterfly Conservation Fund for a proposal to increase habitat for pollinating insects by seeding highway median and roadside areas with a mix of milkweed and other native plants for pollinators by partnering with other state agencies, including the Department of Transportation and Department of Conservation and Recreation. To increase public awareness about pollinators, MassWildlife also created a pollinator demonstration plot at the Westborough Field Headquarters. Project implementation will continue through FY 18.

Landowner Incentive Program (LIP)

The federal government did not fund the LIP in FY 16; as a result the MassWildlife could not apply for federal funding for its state program. MassWildlife is actively pursuing funding to continue the implementation of this program.

Audits

The office of the State Auditor conducts a state audit of the MassWildlife Federal Aid Program once every two years and the U.S. Department of Interior, Office of Inspector General, conducts a federal audit of the program once every 5 years. No audits were active in FY 16.

Other Matters

Additional Federal Aid Coordinator's duties included responding to requests for information, public inquiries, MassWildlife inventory management, overview of projects performance and financial reporting, project assistance (both field and office), field visits, and serving as the liaison between all Federal Aid personnel and the MassWildlife.

Federal Aid Program Personnel

Kris McCarthy, Associate Director of Administration & Finance
Mike Sawyers, Federal Aid Coordinator
Lori Cookman, Fiscal Program Coordinator
Debra Chamberlain, Assistant to the Federal Aid Coordinator
Debbie McGrath, Federal Aid Bookkeeper

Personnel Report—FY2016

Johanna Zabriskie
Human Resources Director / Dept. of Fish and Game

New Hires - Employee			
Name	**Title**	**Action**	**Date of Action**
Bonafini, John	Wildlife Technician III	New Hire	February 21, 2016
Bressette, Raymond	Wildlife Technician II	New Hire	February 21, 2016
Drudi, Travis	Wildlife Technician II	Transfer	October 18, 2015
Gaskin, Gregory	Game Biologist I	New Hire	October 18, 2015
Gipps, Troy	Game Biologist IV	New Hire	May 15, 2017
Jones, Michael	Conservation Biologist IV	New Hire	April 19, 2016
Kautza, Adam	Aquatic Biologist IV	New Hire	May 1, 2016
Keleher, Brian	Aquatic Biologist III	New Hire	March 6, 2016
LaPlante, Ethan	Wildlife Technician III	New Hire	March 6, 2016
McDermott, Derek	Wildlife Technician III	New Hire	February 21, 2016
McMorrow, Conor	Wildlife Technician II	New Hire	March 27, 2016
Quinones, Rebecca	Aquatic Biologist IV	New Hire – Transfer	May 22, 2016
Resha, Kaylee	Game Biologist I	New Hire	October 18, 2015
St. Andre, Jesse	Game Biologist I	New Hire	April 19, 2016

Hires – Contractor Conversions			
Name	Title	Action	Date of Action
Buelow, Christopher	Conservation Biologist III	Hired from Contract	7/1/2015
Frost, Karro	Conservation Biologist III	Hired from Contract	7/1/2015
Glorioso, Lauren	Conservation Biologist III	Hired from Contract	7/1/2015
Holt, Emily	Office Support Specialist II	Hired from Contract	7/1/2015

Huguenin, Tara	Conservation Biologist II	Hired from Contract	7/1/2015
Justham, Kimberly	Conservation Biologist II	Hired from Contract	7/1/2015
Kubel, Jacob	Conservation Biologist III	Hired from Contract	7/1/2015
Leddick, Jesse	Conservation Biologist III	Hired from Contract	7/1/2015
Longsdorf, Jennifer	Office Support Specialist II	Hired from Contract	7/1/2015
MacGillivray, Lisa	Conservation Biologist II	Hired from Contract	7/1/2015
Piche, Marianne	Game Biologist III	Hired from Contract	7/1/2015
Powers, Brent	Conservation Biologist III	Hired from Contract	7/1/2015

Seasonals & Interns			
Boermeester, Mark	Fisheries Technician	Contract Seasonal Employee	April 20, 2016
Johnson, Jason	Fisheries Technician	Contract Seasonal Employee	April 16, 2016
Pszybysz, Tara	Fisheries Technician	Contract Seasonal Employee	April 20, 2016
Earls, Caley	Fisheries Technician	Contract Seasonal Employee	May 16, 2016
Fleming, Connor	Wildlife Technician	Contract Seasonal Employee	May 16, 2016
Fuda, Rebecca	Wildlife Technician	Contract Seasonal Employee	May 16, 2016
Siewert, Charles	Fisheries Technician	Contract Seasonal Employee	April 20, 2016
Sypek, Ian	Fisheries Technician	Contract Seasonal Employee	April 4, 2016

Westgaard, Kristina	Wildlife Technician	Contract Seasonal Employee	May 16, 2016
Burke Perez, Daniel	Laborer I	Long-Term Seasonal	June 12, 2016
Young, Cameron	Laborer I	Long-Term Seasonal	June 12, 2016
Dyer, Keri	Tern Colony	Contract Seasonal Employee	May 1, 2016
Kishida, Christian	Tern Colony	Contract Seasonal Employee	May 1, 2016
Walker, Kiah	Tern Colony	Scientist - Seasonal	May 10, 2016
Zadrozny, Gina	Tern Colony	Scientist - Seasonal	May 10, 2016

Terminations - Employee			
Name	Title	Action	Date
Basler, David	Aquatic Biologist III	Retired	August 1, 2015
Beals, Dale	Wildlife Technician III	Retired	July 31, 2015
Chapin, Robert	Wildlife Technician III	Retired	November 26, 2015
Fritze, Suzanne	Clerk III	Retired	October 30, 2015
Gaskins, Greg	Game Biologist I	Resigned	December 4, 2015
Haggerty, Sarah	Environmental Analyst V	Resigned	June 30, 2016
Jackson, Alan	Wildlife Technician III	Retired	May 30, 2016
Justham, Kimberly	Conservation Biologist II	Resigned	June 2, 2016

Mirick, Peter	Game Biologist IV	Retired	February 14, 2016
O'Leary, John	Program Manager VI	Retired	December 11, 2015
Ohman, Dana	Aquatic Biologist III	Resigned	October 19, 2015
Simmons, Timothy	Conservation Biologist IV	Retired	June 8, 2016
Swain, Patricia	Conservation Biologist IV	Retired	June 29, 2016

Terminations - Contractors			
Name	Title	Action	Date
n/a			

Reclassifications			
Name	Professional Titles	Action	Effective Date
Burnham, James	Program Coordinator II	Reclassification	August 2, 2015

Promotions			
Name	**Title**	**Action**	**Date**
Conlee, Laura	Asst. Dir. of Wildlife Research	Promotion	February 21, 2016
Connors, Christopher	Wildlife Technician III	Promotion	February 7, 2016
Davies, Adam	Fish Culturist III	Promotion	September 6, 2015
Fontaine-Gagnon, Leanda	Aquatic Biologist III	Promotion	March 20, 2016
Hall, Chester	Wildlife Technician II	Promotion	November 29, 2015
Holt, Emily	Program Coordinator I	Promotion	April 17, 2016

Huguenin, Michael	Asst. Dir. of Field Operations	Promotion	February 21, 2016
Jackson, Alan	Wildlife Technician III	Promotion	July 13, 2015
Mathews, Timothy	Wildlife Technician II	Promotion	October 4, 2015
McSharry, Gregory	Fish Culturist II	Promotion	November 29, 2015
Richards, Todd	Asst. Dir. of Fisheries	Promotion	December 13, 2015
Wright, Stephen	Game Biologist III	Promotion	May 1, 2016

A native bumblebee, the common Bombus impatiens*, is approached by another pollinator, the non-native honeybee,* Apis mellifera*.*

Financial Report

Kris McCarthy
Associate Director of Administration & Finance

Summary
Revenue and Fund Equity
Inland Fish and Game Fund
July 1, 2015 to June 30, 2016

DEPARTMENTAL REVENUES:	
Fishing,Hunting, and Trapping Licenses	$5,201,618.11
Archery Stamps	$175,302.60
Primitive Firearm Stamps	$188,416.70
Waterfowl Stamps	$63,492.00
Wildlands Stamps	$969,275.00
Trap Registrations	$2,555.00
Antlerless Deer Permits	$190,845.00
Bear Permits	$79,955.00
Turkey Permits	$127,885.00
Special Licenses,Tags and Posters	$41,264.95
Magazine Subscriptions	$96,552.90
Sales,Other	$179,401.00
Fines and Penalties	$1,225.00
Rents	$439,085.98
Prior Year Refunds	$ -
Donations	$32,785.19
Miscellaneous Income	$29,112.37
PAC	$29,189.00
NSF Charge/Debt. Collection	$380.00
Total	$7,848,340.80
FEDERAL AID REIMBURSEMENTS:	
Dingell-Johnson (Fisheries)	$1,614,429.28
Pittman-Robertson (Wildlife)	$7,209,693.27
Total	$8,824,122.55
TAXES:	
Gasoline Tax Apportionment	$1,001,310.11
OTHER FINANCIAL SOURCES:	
Reimbursement for Half-Price Licenses	$189,828.75
Investment Earnings	$4,441.89
Total	$194,270.64
TOTAL REVENUE	**$17,868,044.10**
FUND EQUITY AS OF JUNE 30, 2016	**$14,598,521.90**

License and Stamp Sales
July 1, 2015 to June 30, 2016

Code	Type of License	Cost	Quantity	Amount
F1	Resident Citizen Fishing	22.5	110,316	2,482,110.00
F2	Resident Citizen Minor Fishing	FREE	7,765	0
F3	Resident Citizen Fishing (Age 65-69)	11.25	8,951	100,698.75
F4	Resident Cit. Fishing (Over 70)	FREE	12,512	0
F4	Resident Cit. Fishing (Disabled)	FREE	260	0
F6	Non-Res. Citizen/Alien Fishing	32.5	10,598	344,435.00
F7	Non-Res. Citizen/Alien Fishing (3 day)	18.5	3,008	55,648.00
F8	Resident Fishing (3 day)	7.5	2,366	17,745.00
F9	Non-Resident (Citizen) Minor Fishing	6.5	414	2,691.00
DF	Duplicate Fishing	2.5	0	0
	Quabbin 1-Day Fishing	5	3,402	17,010.00
T1	Resident Citizen Trapping	30.5	637	19,428.50
T2	Resident Citizen Minor Trapping	6.5	8	52
T3	Resident Citizen Trapping (Age 65-69)	15.25	54	823.5
DT	Duplicate Trapping	2.5	0	0
H1	Resident Citizen Hunting	22.5	16,361	368,122.50
H2	Resident Citizen Hunting (Age 65-69)	11.25	1,009	11,351.25
H3	Resident Citizen Hunting (Paraplegics)	FREE	12	0
H4	Resident Alien Hunting	22.5	153	3,442.50
H5	Non-Res. Cit./Alien Hunting (Big Game)	94.5	2,872	271,404.00
H6	Non-Res. Cit./Alien Hunting (Sm. Game)	60.5	1,108	67,034.00
H8	Resident (Citizen) Minor Hunting	6.5	1,571	10,211.50
DH	Duplicate Hunting	2.5	0	0
S1	Resident Citizen Sporting	40	33,729	1,349,160.00
S2	Resident Citizen Sporting (Age 65-69)	20	4,100	82,000.00
S3	Resident Citizen Sporting (Over 70)	FREE	10,228	0
S3	Resident Citizen Sporting (Disabled)	FREE	50	0
S4	Resident Sporting Paraplegic	FREE	33	0
DS	Duplicate Sporting	2.5	0	0
	TOTAL LICENSE SALES (GROSS)		**231,517**	**5,203,367.50**
	Type of Stamp			
M1	Archery Stamps	5.1	34,379	175,332.90
M2	Waterfowl Stamps	5	12,703	63,515.00
M3	Primitive Firearm Stamps	5.1	36,952	188,455.20
W1	Wildlands Stamps	5	175,778	878,890.00
W2	Non-Resident Wildlands Stamps	5	18,077	90,385.00
	Duplicate Stamps	2.5	0	0
	TOTAL STAMP SALES (GROSS)		**277,889**	**1,396,578.10**
	Previous Years Stamp Sales			
M1	Archery Stamps		0	0
M2	Waterfowl Stamps		0	0
M3	Primitive Firearm Stamps		0	0
	TOTAL STAMP SALES (GROSS)		**0**	**0**
	Fees Retained and Adjustments by Clerks			-47.05
	Refunds			-1,794.14
	TOTAL			**-1,841.19**
	TOTAL LICENSE/STAMP SALES (NET)			**6,598,104.41**

HOW THE SPORTSMEN'S DOLLAR WAS SPENT
INLAND FISH AND GAME FUND
JULY 1, 2015 TO JUNE 30, 2016

PROGRAMS/ASSESSMENTS		TOTAL	PERCENTAGES
Administration:			
Administration	$	1,623,597	
Information-Education	$	1,063,757	
Dcamm ISA Field Headquarters	$	104,591	
Total	**$**	**2,791,945**	**14.5%**
Fisheries and Wildlife Programs:			
Hatcheries	$	2,541,933	
Game Bird Program	$	607,894	
Seasonals	$	75,803	
Cooperative Units	$	164,149	
Fisheries and Wildlife Management	$	8,249,420	
Total	**$**	**11,639,198**	**60.3%**
Other Programs:			
Land Acquisitions	$	1,443,416	
Waterfowl Management Program	$	50,812	
Hunter Safety Program	$	494,557	
Total	**$**	**1,988,786**	**10.3%**
Other Assessments:			
GI and Other Fringe Benefits	$	2,730,293	
Payroll Taxes	$	153,013	
Total	**$**	**2,883,306**	**14.9%**
TOTAL EXPENDITURES	**$**	**19,303,234**	**100.0%**

Summary
Revenues, Expenditures and Fund Equity
Natural Heritage & Endangered Species Fund
July 1, 2015 to June 30, 2016

REVENUES:		
Natural Heritage and Endangered Species Tax Checkoff Donations	$	186,305.47
Sales	$	8,592.50
NRCS/Wildlife Habitat Incentives Program (WHIP)	$	43,750.00
State Wildlife Grant (SWG)	$	1,341,632.03
Coastal Program	$	51,354.54
Massachusetts Endangered Species Act Fees	$	412,400.00
Contracts	$	2,300.00
Direct Donations	$	7,573.00
Interest	$	396.97
TOTAL REVENUES:	**$**	**2,054,304.51**
EXPENDITURES:		
Natural Heritage and Endangered Species Program	$	1,048,442
Tern Restoration	$	70,757
State Wildlife Grant	$	33,808
TOTAL EXPENDITURES:		**1,153,006.72**
FUND EQUITY AS OF JUNE 30, 2016	**$**	**2,838,079.34**

Other Funds and Programs Expenditures
Division-wide
July 1, 2015 to June 30, 2016

Capital Outlay Funds:	FY 16
Land Protection - Habitat Management- CR Stewardship	$1,083,705.78
Staffing for Land and Infrastructure Programs	$527,679.93
Hatchery/District/Westborough Field Headquarters Repairs	$379,646.54
Climate Change Assessment	$236,889.37
Habitat Grant Program	$363,412.70
Dam Safety and Repair	$221,616.96
TOTAL CAPITAL EXPENDITURES	**$2,812,951.28**
Interdepartmental Service Agreements	
Massachusetts Highway Department	$199,702.81
Executive Office of Energy and Environmental Affairs	
Off Highway Vehicle Trust ISA	$74,000.00
Dept of Conservation and Recreation	$10,701.52
Division of Capital Asset Management and Maintenance	$126,926.40
TOTAL ISA EXPENDITURES	**$411,330.73**
Natural Heritage and Endangered Species Line Item	**$149,891.01**
Federal Grant Accounts	
Landowner Incentive Program	$225,089.41
New England Cottontail	$183,917.09
White-Nose Syndrome	$40,679.76
TOTAL FEDERAL EXPENDITURES	**$449,686.26**
TOTAL OTHER TRUST EXPENDITURES	**$3,823,859.28**

On Saturday June 4, 2016, Mass-Wildlife celebrated its 150th anniversary with an open house at the new Field Headquarters in Westborough. The event featured interactive displays, demonstrations, kids crafts, guided nature walks, live animals, and hands-on activities like archery, casting, and simulated target shooting, plus cake and a BBQ, and was attended by 1,000 people!

Annual Report 2016

Massachusetts Division of Fisheries & Wildlife

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Annual Report 2016

Massachusetts Division of Fisheries & Wildlife

Jack Buckley
Director

Susan Sacco
Assistant to the Director

Mark S. Tisa, Ph.D.
Deputy Director
Administration

Michael Huguenin
Assistant Director
Field Operations (partial year)

Jim Burnham
Administrative Assistant to the
Deputy Director, Administration

Debbie McGrath
Administrative Assistant to the
Deputy Director, Field Operations

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