Aquatic Resource Mitigation Fund

Status, Trends and Program Improvements

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Pennichuck Brook, Nashua, NH – credit: Lori Sommer
Silver Maple floodplain forest, Upper Connecticut Service Area – credit: Melinda Bubier
Salt marsh, Rye, NH - credit: Jen Drociak

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NEW HAMPSHIRE DEPARTMENT OF
Environmental Services

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Acknowledgements

This report was developed to meet the requirements authorized under the NHDES Final In-Lieu Fee Program Instrument, signed by the US Army Corps of Engineers and NHDES on May 8, 2012. It provides a comprehensive summary of all program activity since its inception in 2006 through December, 2016.

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Zeland River, Bethlehem, NH – credit: RM Levasseur

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List of Acronyms and Abbreviations

United States Army Corps of Engineers..... ACE
Aquatic Resource Mitigation..... ARM
Hydrologic unit code..... HUC
New Hampshire Department of Environmental Services..... NHDES
New Hampshire Fish and Game Department.....NHFG
New Hampshire Department of Transportation.....NHDOT
State General Permit..... GP

Cowardin Class Impact Types (addressed in this report)

Estuarine
subtidal wetland..... E1
intertidal wetland..... E2

Lacustrine
limnetic wetland..... L1
littoral wetland.....L2

Palustrine
emergent wetland..... PEM
forested wetland.....PFO
scrub-shrub..... PSS
unconsolidated bottom.....PUB

Riverine
tidal wetland..... R1
lower perennial wetland..... R2
upper perennial wetland.....R3
intermittent wetland.....R4

Executive Summary

The New Hampshire Department of Environmental Services (NHDES), Aquatic Resource Mitigation (ARM) Fund was established in 2006 and the law creating the ARM Fund program became effective on August 18, 2006. NHDES adopted implementing rules to operate the fund effective on June 20, 2006. The approved ARM Fund Final In-lieu Fee (ILF) Program Instrument (Instrument), was signed by the United States Army Corps of Engineers (ACE) New England District, District Engineer on May 8, 2012, and the NHDES Commissioner on May 17, 2012. This report includes information on performance of the ARM Fund from the pre-mitigation rule, starting January 2007 through December 2016.

Through the reporting period, 146 applicants have used this form of mitigation and these funds have been used to support projects that restore, enhance, and preserve aquatic resources and upland buffers. The program has been very successful for grant applicants and has resulted in approximately 16,026 acres of land conservation, 100 acres of wetland restoration/enhancement, 15 acres of tidal restoration/enhancement, and approximately 50 miles of stream passage improvements. The ILF program has become a good option for applicants needing to provide compensatory mitigation. The total funds collected since the program was established is $15,390,250, which has gone to fund 80 projects throughout the state. For the total of funds awarded, over $30 million of funds was leveraged to complete the grant projects.

Introduction

New Hampshire RSA 482-A:3 requires a wetland permit for any proposed project that involves dredging or filling of a wetland. ACE approval of the Instrument constitutes the regulatory approval required for the State of New Hampshire ILF program to be used to provide compensatory mitigation for ACE permits, pursuant to 33 C.F.R. 332.8(a)(1). The goal of the NHDES Wetlands Bureau is to minimize wetland loss or to guide applicants, where appropriate, to impact lower value wetlands if impacts are unavoidable, and to compensate for offsetting loss through high-quality mitigation activities. Wetland loss is a permanent loss of important functions provided by these aquatic resources, such as wildlife habitat, water quality improvements and flood storage. Since the late 1990s, protection of wetland-surrounding upland areas with significant habitat value has been the preferred form of mitigation for wetland loss and this has only increased in importance over time. Other mitigation options include wetland creation (least desirable option), restoration and enhancement, but these types of sites are not easy to locate and are often not sustainable in the long-term. Where appropriate, guiding permitted impacts to lower quality wetlands to protect high-value wetland areas is a successful strategy for maintaining critical habitat features and water quallity/storage functions in the landscape.

Development in New Hampshire's watersheds is a continuous threat to wetlands, floodplains, streams and overall habitat. A 2009 report compiled by United States Department of Agriculture (USDA) indicates that watersheds in the East have the highest potential for future water quality changes as a result of housing density increases, and that New Hampshire is especially vulnerable. Of the 15 watersheds identified nationally that could experience the largest water quality changes as a result of increased housing density, two New Hampshire watersheds ranked in the top four – the Merrimack watershed, with over 400,000 acres of private forest projected to shift out of rural classifications, and the Piscataqua watershed with nearly 350,000 acres projected.[1] Additionally, utility and roadway upgrades (i.e., pipeline projects, power transmission lines and Interstate-93 widening) in these watersheds threaten and impair existing resources. Further, a recent study completed by The Nature Conservancy found that "more southerly regions and lower elevation zones have far less area in conservation ownership, even though those areas often have tremendous natural resource significance and are typically at greater risk of conversion."[2]

New Hampshire's wetlands, and their associated uplands, floodplains and riparian areas, provide important func-

[1]Private Forests, Public Benefits: Increased Housing Density and Other Pressures on Private Forest Contributions. http://www.fs.fed.us/openspace/fote/benefits_files/pnw-gtr795_pt2.pdf, December 2009.
[2]http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newhampshire/explore/nh-tnc-spnhf-sb388-report-2014.pdf

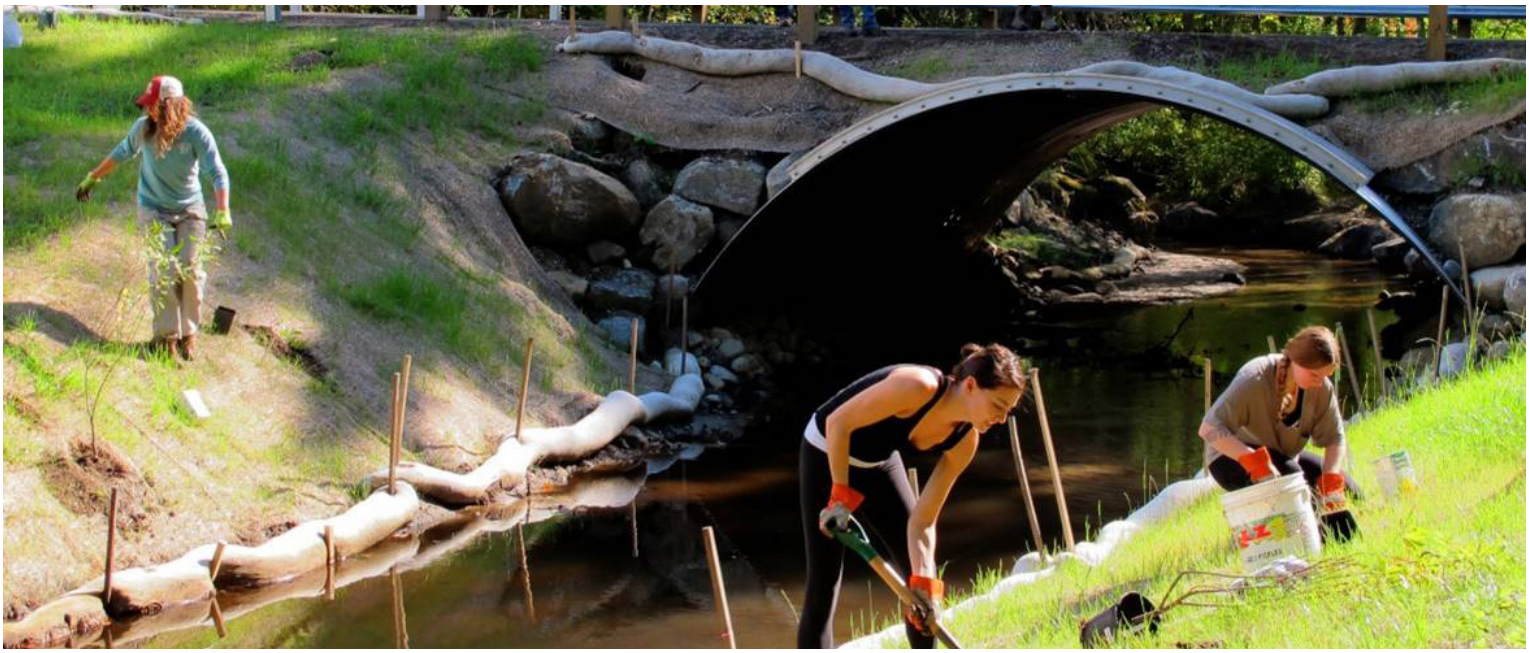
tions in terms of flood control, wildlife habitat, nutrient attenuation, water filtration and toxicant transformation, and storage and recharge for both groundwater and surface waters. These wetland functions become more vulnerable with continued development and land conversion. In addition, increases in severe flood events, and the threat of sea level rise induced by climate change, have impacted many municipalities in New Hampshire and emphasize the critical role wetlands play in flood storage within this landscape. Inadequate or undersized stream crossings, which can exacerbate flooding, can also create barriers to fish passage and other aquatic animals, and impede natural sediment transport processes. These factors demonstrate the need to strategically preserve and improve stream crossings to lessen impacts to aquatic habitat and fish migration routes, and reduce flooding.

Prior to the ARM Fund program, permittees were the only entities performing compensatory wetland mitigation. The ILF Instrument executed between ACE and NHDES establishes NHDES as an entity responsible for providing compensatory wetland mitigation. Essentially, NHDES pools the in-lieu fees it collects into the ARM Fund, by service area, and uses the funds to perform high-value conservation, wetland restoration or aquatic resource improvements. One distinction with the mitigation process that is not consistent with the federal Mitigation Rule (33 CFR 332) is a preference by NHDES to first review potential local compensatory mitigation options developed by the municipality where the impact is proposed to occur, prior to payment into the funds. Municipal conservation commissions have the opportunity to comment on applications for wetland permits. In practice, conservation commissions usually work with developers in the process of identifying and selecting a property to conserve for compensatory wetland mitigation. Indeed, the more conservation commissions work with developers to find appropriate compensatory wetland mitigation, the more likely it will be that NHDES and ACE will be able to issue permits using that mitigation option. Consequently, savvy conservation commissions develop detailed plans targeting parcels for land conservation.

Over the 10 years of the program, grants have been offered for activities that restore or protect aquatic resources, including but not limited to:

- Restoration practices with proven success such as: wetland fill removal; elimination of ditching and other hydrological modifications; planting buffers; culvert removal and replacement; and habitat enhancement opportunities for threatened or endangered species.
- Costs associated with wetland restoration such as development of final design plans, site clearing and excavation, construction management, consulting fees, permit costs, wetland grading, soil augmentation, planting, monitoring and maintenance to reduce risk of failure.
- Acquisition of land or conservation easements that help protect high conservation-value wetlands in perpetuity and associated costs including property surveys, appraisals, legal costs, closing costs, etc.
- Other aquatic resource improvement or protection projects, such as water quality improvement projects; dam removal projects; stream or river restoration projects; culvert replacements to improve aquatic organism passage; oyster reef restoration; tidal shoreline enhancements; or other aquatic resource improvements.

Falls Brook culvert restoration project – Lower Connecticut River watershed



Silver Maple floodplain forest, Upper Connecticut River watershed – credit: Melinda Bubier

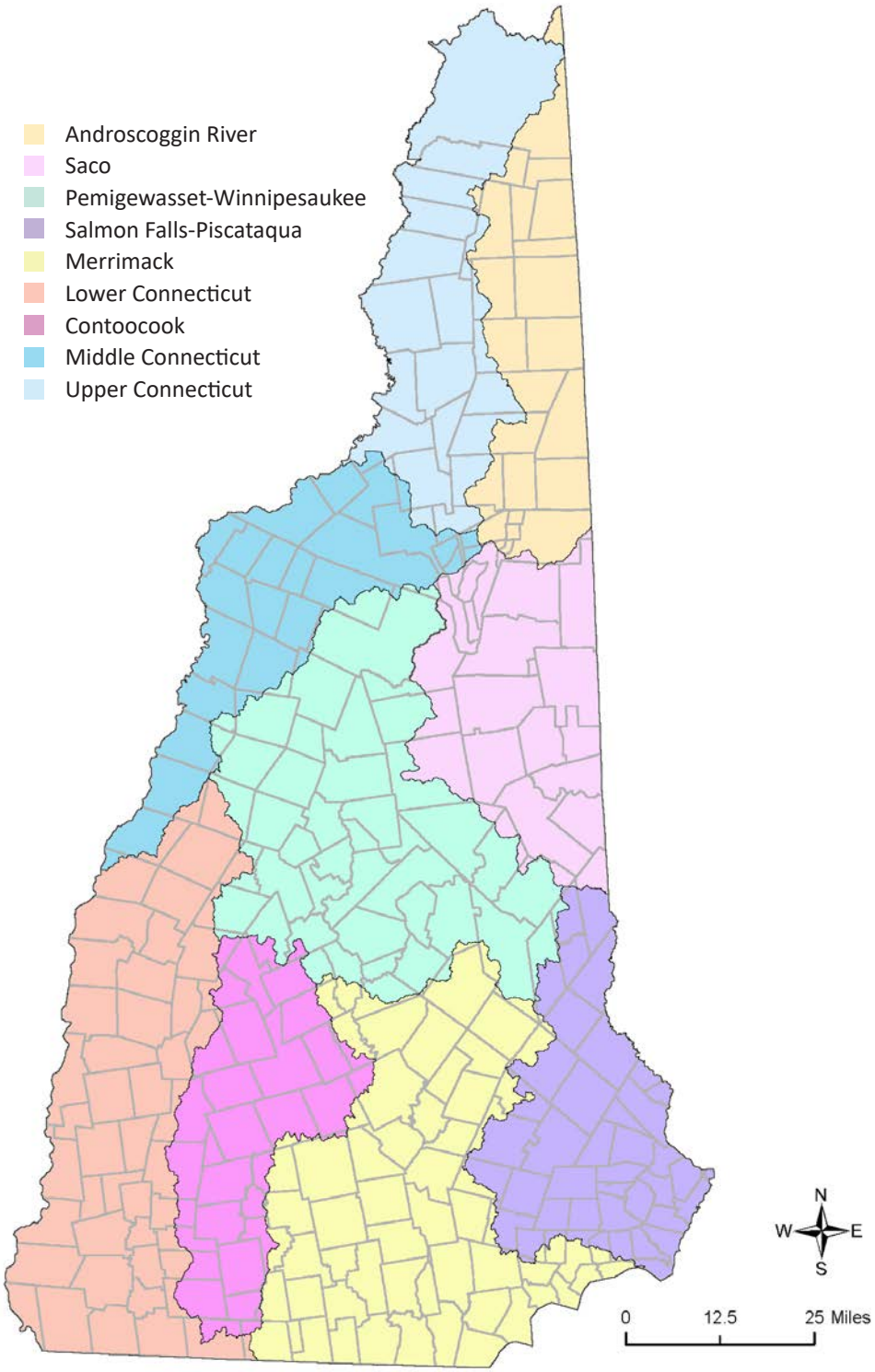
Operation of the ARM Fund

In-lieu of traditional forms of compensation for wetland losses, NHDES adopted the payment option for applicants unable to find meaningful mitigation. In 2006, the ARM Fund was established under a Memorandum of Understanding with ACE, which was subsequently brought into compliance with the 2018 federal Mitigation Rule with the ILF Instrument signed May 17, 2012. The Instrument sets guidelines, responsibilities and standards for the use, operation and maintenance of the ARM Fund, and establishes NHDES as the qualified ILF program sponsor and administrator for the ARM Fund program. NHDES works with ACE to ensure that requirements for aquatic resource compensation are being met and recognizes that, ultimately, NHDES is solely responsible for providing compensatory mitigation for projects that have paid into the ARM Fund.

During the 2012 legislative session, the General Court enacted Senate Bill 1380 for a change to RSA 482-A:28 through RSA 482-A:33. The final language provides a change from 16 hydrologic unit code 8 (HUC 8) areas where payments can be provided to nine service areas. The language notes a service area may be a HUC 8 watershed, as developed by the United States Geological Survey, or a modification of a HUC 8 watershed by NHDES, as approved by the United States Army Corps of Engineers. The following report is based on the new nine service areas (Figure 1).

In FY 2013, the program initiated a new grant process by requesting brief pre-proposals for review by the mitigation coordinator, Site Selection Committee and federal agency representatives. This review team determines if the pre-proposals meet the program goals, how the project could be strengthened, and provides other suggestions that may improve the proposed project. Upon review, select projects are invited for sub-

Map 1 – Map of New Hampshire watershed-based service areas



mittal of a full application. This new step improves efficiency for applicants and reviewers, saves applicants the cost of a full application if their proposal is not appropriate, and it serves to improve application submittals.

The ARM Fund program provides wetland permit applicants the opportunity to provide funds into accounts for each watershed-based service area; the funds are then disbursed to significant restoration or land conservation projects in those same service areas. The ARM Fund recognizes the potential for long-term environmental results from wetland mitigation that considers watershed goals, assists conservation efforts in recognizing green infrastructure plans of a town or region, and has the ability to target important and vulnerable wetlands in a region. The following sections focus on the loss and gains in the nine ARM Fund service areas with particular focus on wildlife habitat, water supply and floodplain resources.

In-Lieu Fee Payments Received by the ARM Fund

The ARM Fund has received a total of 146 payments from permitted wetland and stream impacts that required compensatory mitigation since 2006, totaling $15,390,250.47. Before the establishment of the Instrument in 2012, ARM had collected $6,442,640.06 to compensate for 44.3 acres of wetland loss and 625 linear feet of stream impacts (Table 1). Since the establishment of the Instrument in 2012, the ARM Fund has collected $8,947,610.41 to compensate for 42.8 acres of wetland loss, 12,369 linear feet of stream impacts, and 65 acres of converted wetlands (Table 2). Over the past decade, the overall permitted activities that required the largest ILF payments were transportation, utility and commercial projects. Significant payments were made for an airport project in 2011, transportation projects in 2010 and 2016; commercial development has consistently been a significant contributor statewide (Figure 1).

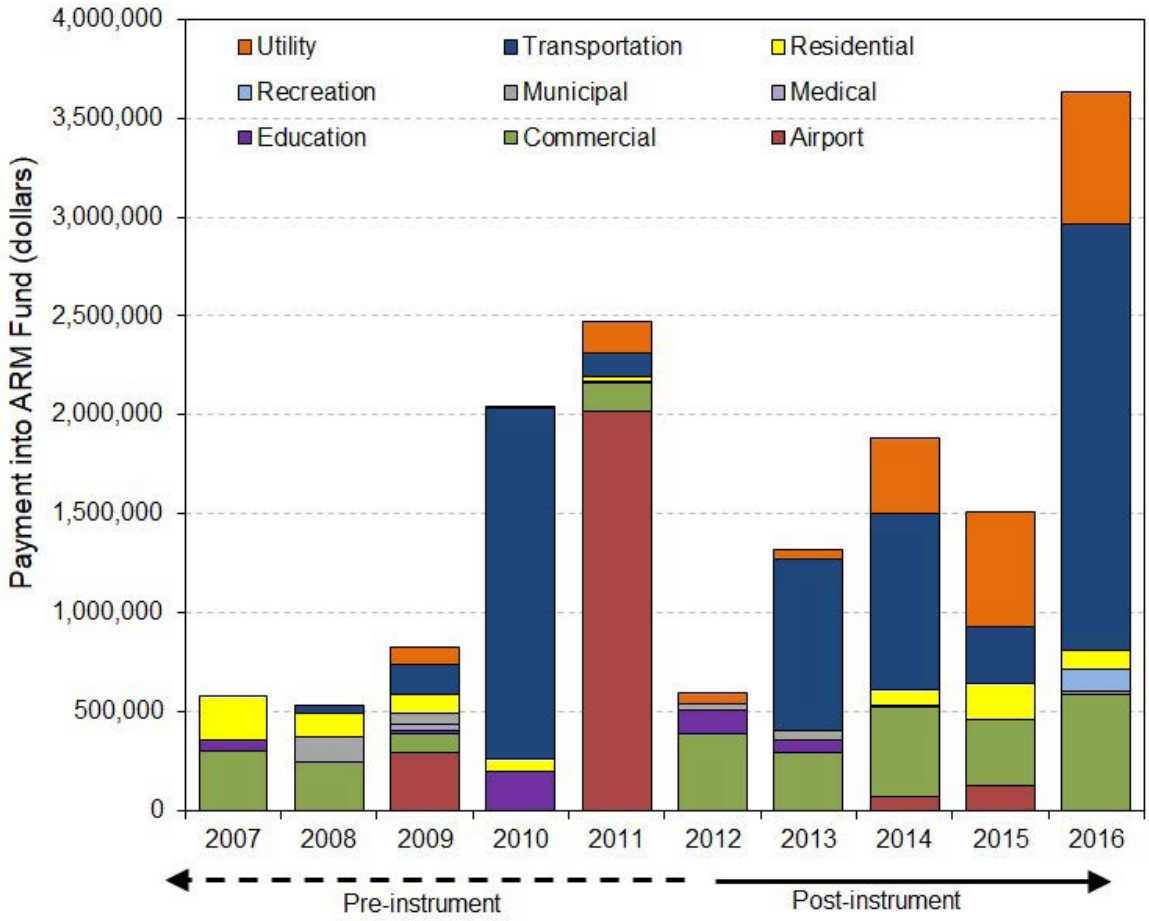
Table 1 – Summary of total permit payments into the ARM Fund Pre-Instrument (2007-2011) and the associated wetland, stream and secondary conversion impacts.

Service Area	Number of permits issued using ILF	Total payment amount	Total wetland loss (ft^2) – permanent impacts	Total stream loss (linear ft)	Total wetland conversion (ft^2) – secondary impacts
Androscoggin	4	103,096.20	1.08	0	0
Contoocook	3	20,017.07	0.56	78	0
Lower Connecticut	5	606,822.90	4.17	0	0
Merrimack	14	2,978,932.14	18.16	547	0
Middle Connecticut	9	223,396.66	3.64	0	0
Pemigewasset	9	629,440.99	4.70	0	0
Saco	1	48,534.45	0.38	0	0
Salmon Falls	9	1,676,240.06	10.14	0	0
Upper Connecticut	2	156,159.59	1.50	0	0
Total	**56**	**6,442,640.06**	**44.33**	**625**	**0**

Table 2 – Summary of total permit payments into the ARM Fund Post-Instrument (2012-2016) and the associated wetland, stream and secondary conversion impacts.

Service Area	Number of permits issued using ILF	Total payment amount	Total wetland loss (ft²) – permanent impacts	Total stream loss (linear ft)	Total wetland conversion (ft²) – secondary impacts
Androscoggin	1	67,628.00	0.50	0	0
Contoocook	1	191,858.90	0	0	9.36
Lower Connecticut	12	1,104,962.77	3.36	746	12.83
Merrimack	28	4,966,411.03	27.10	10,488	30.41
Middle Connecticut	8	555,590.32	2.73	250	6.48
Pemigewasset	10	302,410.69	1.49	171	1.36
Saco	2	25,241.88	0.15	350	0
Salmon Falls	25	1,591,446.82	7.44	134	4.56
Upper Connecticut	3	142,060	0	230	0
Total	**90**	**8,947,610.41**	**42.77**	**12,369**	**65.01**

Figure 1 – Payments statewide.

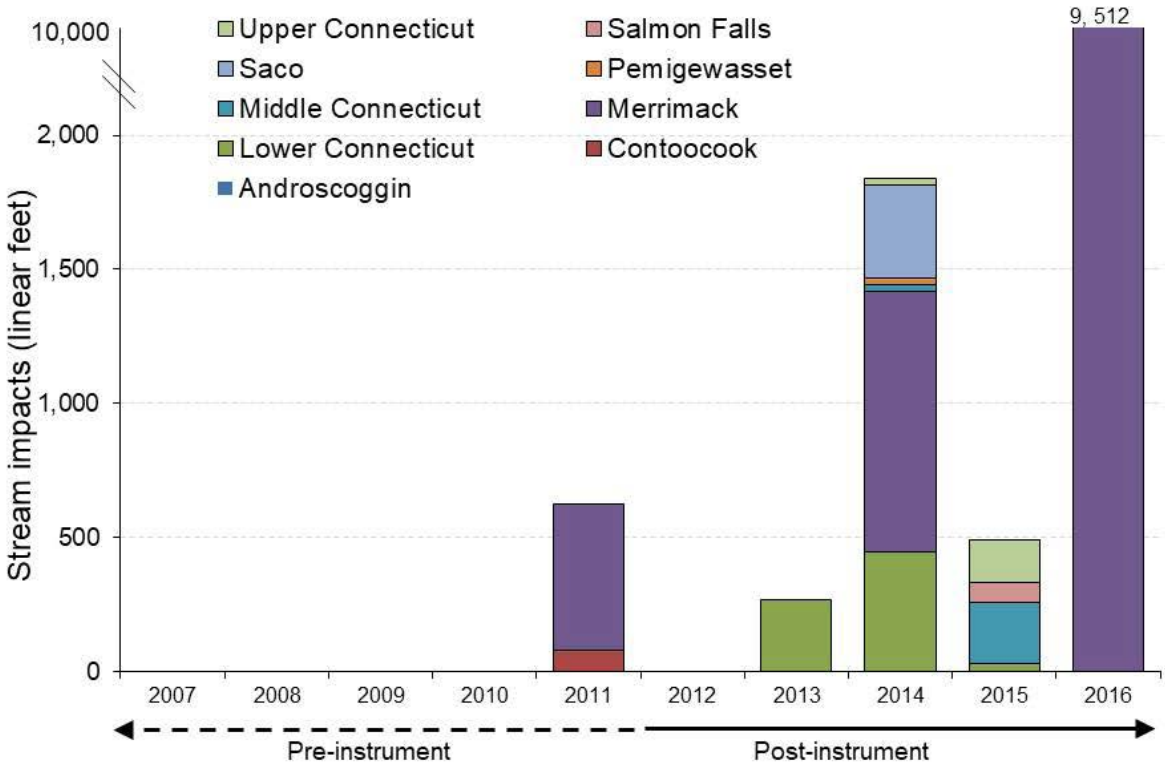


During the operation of the ARM Fund, several legislative changes have occurred that have affected the amount collected. Over several years, the administrative assessment was adjusted from 5% of a calculated payment up to the current 20%. In addition, during the 2009 legislative session, Senate Bill 65 was entered into legislation to expand the use of the payment option for wetland impact projects. The amendment eliminated the one-acre impact threshold to allow any project to provide payment in-lieu of other forms of mitigation. SB 65 also established the opportunity for stream related impacts to provide payments into the fund. The calculation of a stream payment that was adopted is as follows:

> ***482-A:30-a Payment for Stream or Shoreline Losses.***
>
> *For stream or shoreline resource losses, the in-lieu payment shall be the sum of:*
>
> *I. The cost that would have been incurred if a stream of the same type was restored at the ratios adopted by the department, based on a price of $200 per linear foot of channel or bank impacts or both, to be adjusted at the beginning of the calendar year according to the annual simple rate of interest on judgments established by RSA 336:1; and*
>
> *II. An administrative assessment equal to 20 percent of the amount in paragraph I.*
>
> ***Source Note of Changes**. 2009, 303:3. 2010, 16:4. 2011, 171:3, eff. July 1, 2011; 171:4, eff. July 1, 2015.*

With adoption of a stream payment option in 2009, NHDES developed rules to incorporate payments for stream impacts and ARM has been compensated for 12,369 linear feet of bank and channel impacts, through 2016 (Figure 2). The majority of stream impacts were incurred within the Merrimack service area in 2014 and 2016 for large transportation projects that involved culvert improvements, roadway reconstruction and the expansion of an interstate highway.

Figure 2 – Stream impacts statewide.

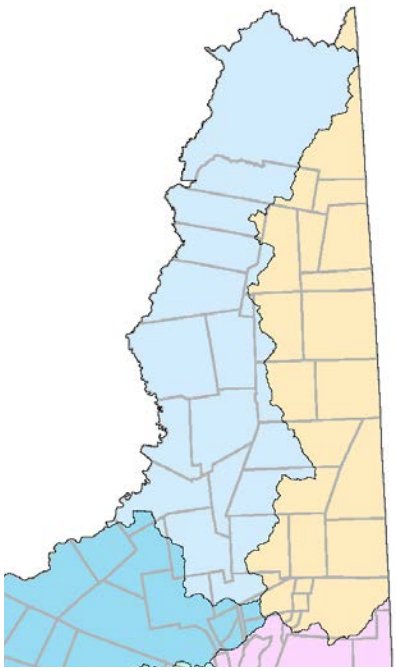


Program adjustments in 2014 required that State General Permits (GPs), which are administered in conjunction with federal oversight by ACE, require compensatory mitigation for wetland conversion impacts – this has resulted in ILF payments into the ARM Fund from secondary and temporary impacts due to federal requirements. NHDES lacks the statutory authority to require mitigation for temporary or secondary impacts but may include compensation as part of a permit issued under the GPs issued by ACE. GPs minimize duplication between NHDES regulatory programs and ACE regulatory program. GPs also eliminate the need to apply for separate approval from ACE for most minor, non-controversial work, when it is authorized by NHDES. However, impacts to aquatic resource functions resulting from temporary placement of fill, or as a secondary impact of the permanent or temporary placement of fill, can be substantial, and are recognized by ACE as impacts that generally require mitigation.

In these cases, ACE finds it necessary to compensate for such temporary and secondary impacts to prevent a net loss in aquatic resource functions and published regulations in the March 19, 2012, Federal Register, which states in C.23.(h): "Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level."

As a result of ACE regulations, in 2016, NHDES revised the mitigation rules, which specifically state the following in Env-Wt 803.08(c): "For any project that also requires a federal permit from the US Army Corps of Engineers (US ACE) under section 404 of the Clean Water Act, the applicant shall consult with the US ACE relative to whether additional mitigation will be required in order to satisfy federal mitigation requirements. When ACE requires this type of mitigation and the application satisfies the GP requirements, the payment may be provided to NHDES as federal compensation." This has been the case with multiple utility projects needing to clear trees and vegetation within existing power lines and in new lines. The increase in these types of impacts rose considerably in 2014 as the federal requirements and Corps guidance has been consistently applied to projects seeking authorization under the GP (Tables 1 and 2). In the following sections, specific information is noted according to activity in the nine service areas.

Purgatory Brook wetland – Bow, NH



Androscoggin Service Area

The Androscoggin service area is in the northeastern region of New Hampshire and borders Maine on the east. This is the smallest service area at 462,582 acres, and is one of the least densely populated regions of the state, with only 2% of the region being developed. A large portion of the watershed is contained within the White Mountain National Forest and other conserved land, with 89% classified as forested land cover. Only four permitted projects required an ILF payment from 2007-2011,the largest being a commercial project associated with site improvements for a lumber company that resulted in 0.6 acres of wetland loss in 2008. In 2010,a New Hampshire Department of Transportation project with 0.5 acres of wetland loss resulted in a $30,708 payment for municipal road construction. Since the establishment of the Instrument in 2012, there was only a single project that required ILF payment: the expansion of a lumber site resulting in 0.6 acres of wetland loss.

Due to low population density and development in this service area, there has not been a significant amount of permanent wetland loss nor secondary conversion impacts over the past decade. During the Pre-Instrument period, there was 1.08-acre of wetland loss, the majority being palustrine wetlands of the scrub-shrub, forested and emergent classes, with a smaller amount of riverine loss. The Post-Instrument period experienced less overall wetland losses (0.5 acres), with the majority being palustrine forested wetland (Figure 4). The Androscoggin service area has not had any projects that have resulted in stream or wetland conversion secondary impacts in the past decade.

Figure 3 – Payment into the ARM Fund by project type.

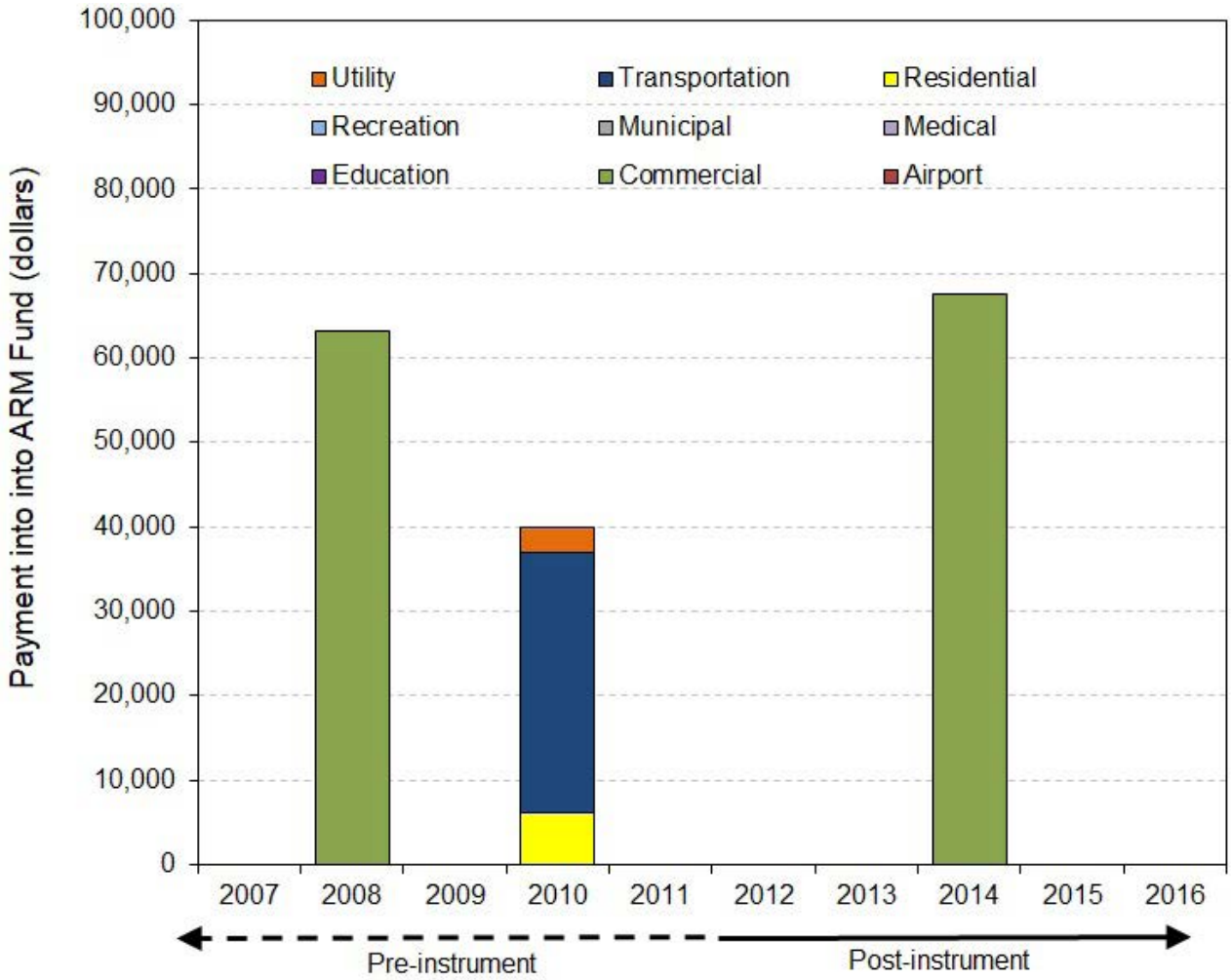
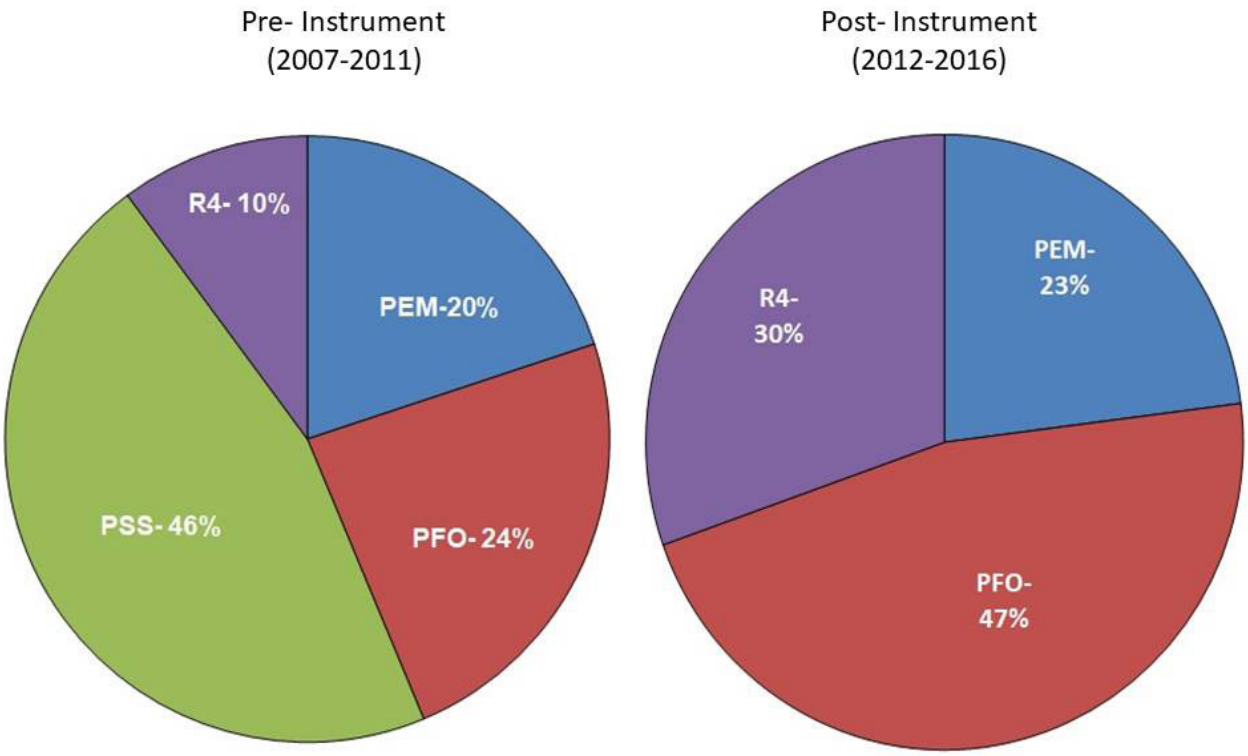


Figure 4 – Wetland impacts by Cowardin class.



Cowardin classification

The Cowardin class is a system of classifying wetland into the following primary types:

Marine – areas exposed to the open ocean.

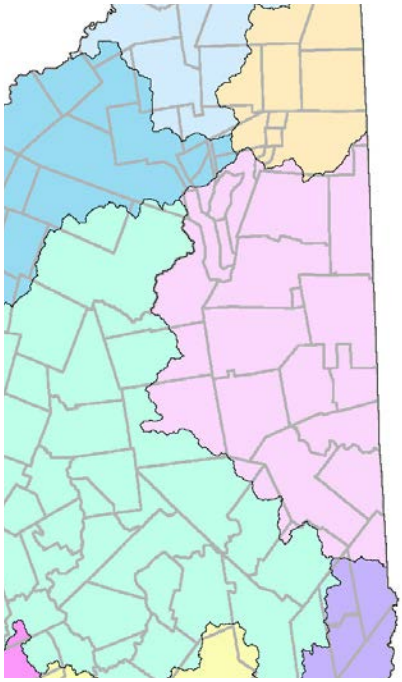
Estuarine – areas with a mix of salt and fresh waters, such as coastal salt marshes.

Riverine – areas associated with flowing water.

Lacustrine – areas associated with a lake, pond or other body of fresh water.

Palustrine – freshwater wetlands that are not associated with a lake or river.

Greenough Ponds – Erroll, NH
photo by Jerry and Marcy Monkman/Ecophotography, courtesy of The Trust for Public Land



Saco Service Area

The Saco service area is moderately sized at 556,244 acres and lies in the central-eastern portion of the state, bordering Maine on the east. This is a low-population area that has experienced minimal development (4% of land area developed) and has a considerable amount of land in conservation (55%), of which the White Mountain National Forest accounts for 230,189 acres (80%). In the past 10 years, 0.53 acres of permanent wetland loss and 350 linear feet of stream impacts have required payment into the ARM Fund for compensatory mitigation. There was a single ILF payment for a dredge and fill permit affecting 0.38 acres of wet meadow for access and lot development of a replacement nursing home facility (Figures 5 and 6); there were two permits issued in 2014 requiring ILF payments for utility and transportation projects that resulted in a total of 350 linear feet of stream impacts, and a loss of 0.15 acres of forested wetland (PFO, Figure 6).

Champney Falls, Albany, NH – credit: Lucy Magee

Figure 5 – Payment into the ARM Fund by project type.

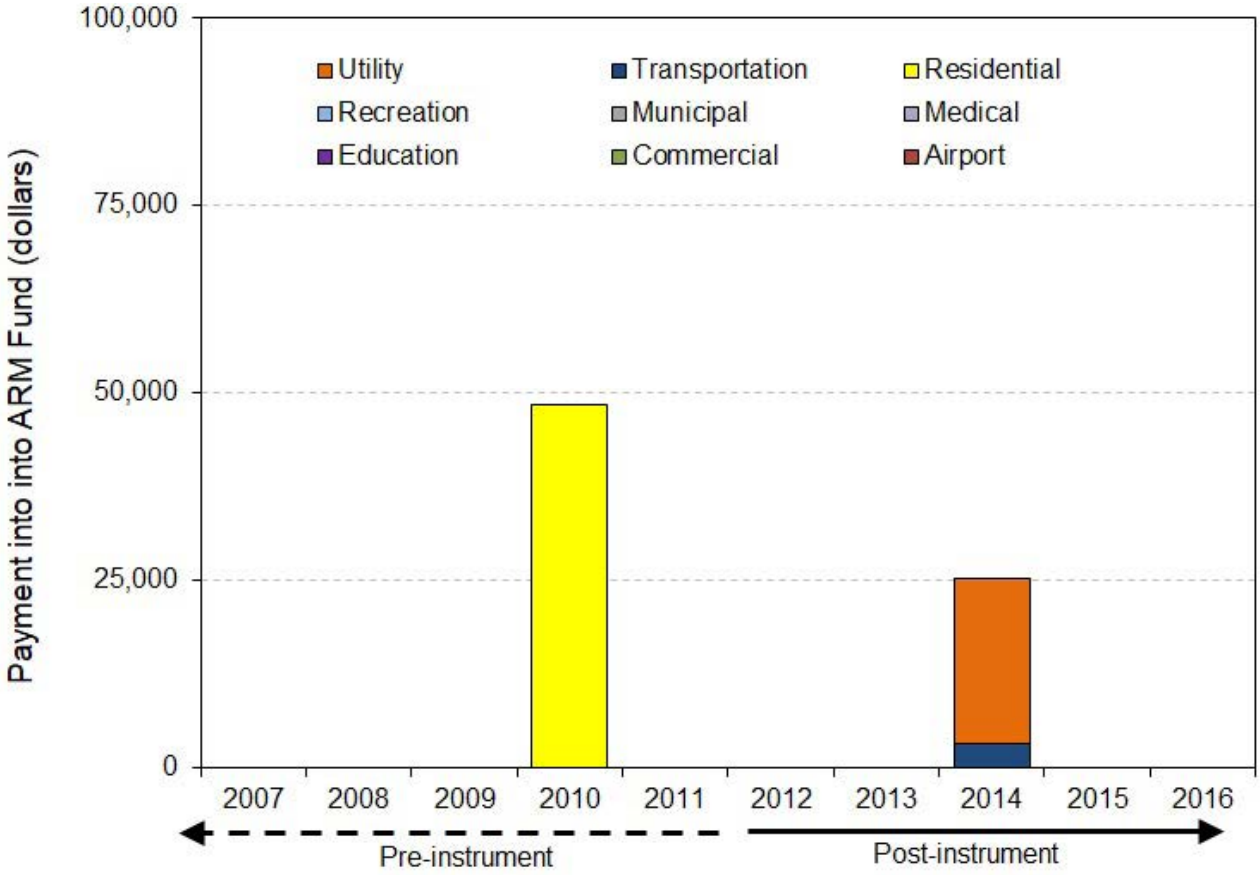
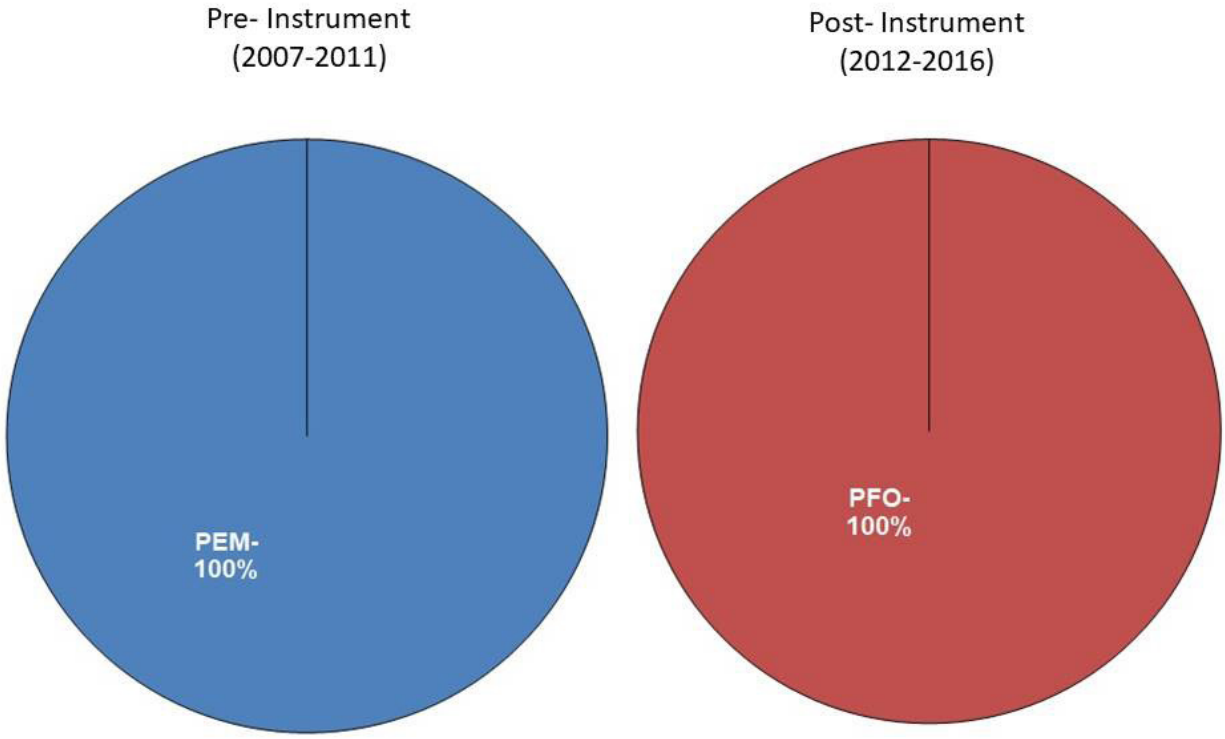
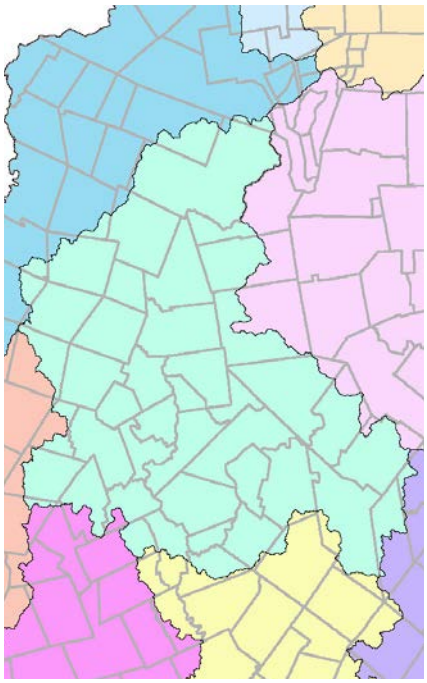


Figure 6 – Wetland impacts by Cowardin class.





Pemigewasset – Winnipesaukee Service Area

The Pemigewasset service area is the second largest and covers 965,103 acres. This region encompasses several large lakes (Winnipesauke, Squam Lake, Newfound Lake, and Winnisquam Lake) and also a significant portion of White Mountain National Forest. A significant portion of the service area is forested (81%) and it is a low-development area (5%). There were nine permits issued Pre-Instrument and 10 payments Post-Instrument that required compensatory mitigation, totaling $931,851.68. During the Pre-Instrument period, payments were received for transportation, residential and commercial projects. The largest Pre-Instrument payment was to compensate for a municipal traffic circle improvement project by the New Hampshire Department of Transportation (NHDOT) in 2010 that resulted in a loss of 1.13 acres of forested wetland. In 2011, a utility project payed $150,000 to dredge and fill 1.05 acres of wetlands and streams, and temporarily impact 0.33 acres of wetlands to construct a power generating wind park. Other projects required to make payment were for residential subdivision development and hotel lodging expansion. During the Post-Instrument period, a total of $302,410 was payed into the ARM Fund for 1.49 acres of wetland loss, 171 linear feet of stream impacts, and 1.36 acres of wetland conversion. The majority of projects during this time frame were for commercial projects that were permitted in 2013 (Figures 7 and 8). A large payment ($134,093.32) was required for development to expand a marketplace that resulted in 0.72 acres of forested wetland loss (PFO; Figure 8) in 2013. Post-Instrument transportation projects permitted to NHDOT that required payments included reconstruction of municipal roadways, drainage improvements and stream crossing (bridge and culvert) rehabilitation.

Over the course of a decade, the Pemigewasset service area has been compensated for a total of 6.19 acres of permanent wetland loss, 171 linear feet of stream impacts and 1.36 acres of secondary impacts from wetland conversion. During both the Pre- and Post-Instrument periods, the majority of wetland impacts have been the loss of forested and emergent wetlands (PFO; Figure 8). During the Pre-Instrument period, there was also a significant portion of intermittent riverine wetland impacts from property development for condominiums and resort facilities. There were several projects permitted to NHDOT that resulted in 171 linear stream impacts for stormwater improvements, culvert upgrades, bridge stabilization and road widening. Conversion of palustrine shrub-scrub (0.78 acres) and palustrine emergent (0.57 acres) wetlands were permitted for occurred installation of a utility distribution line in 2016.

Page Pond and Forest, Meredith, NH

Figure 7 – Payment into the ARM Fund by project type.

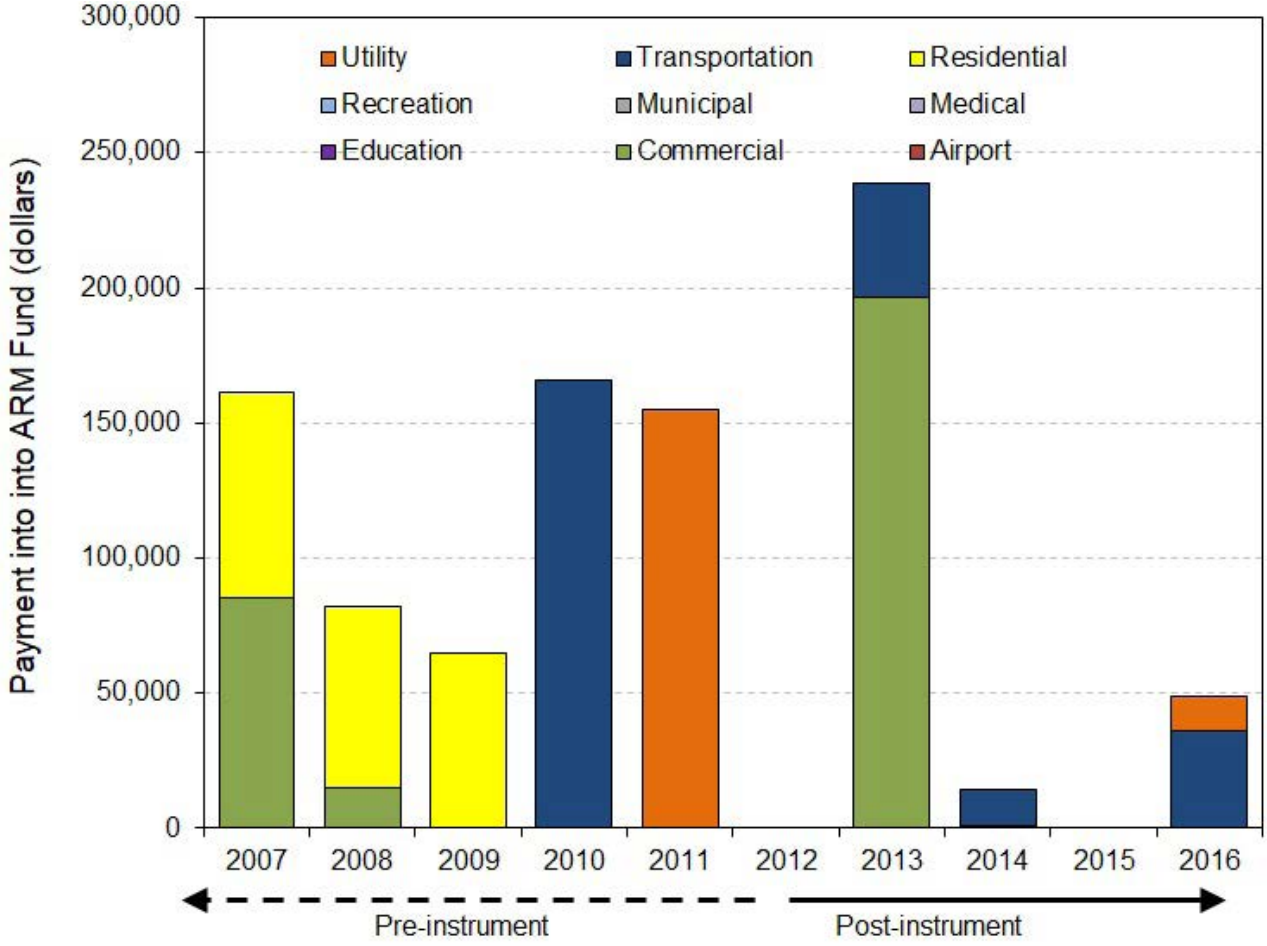
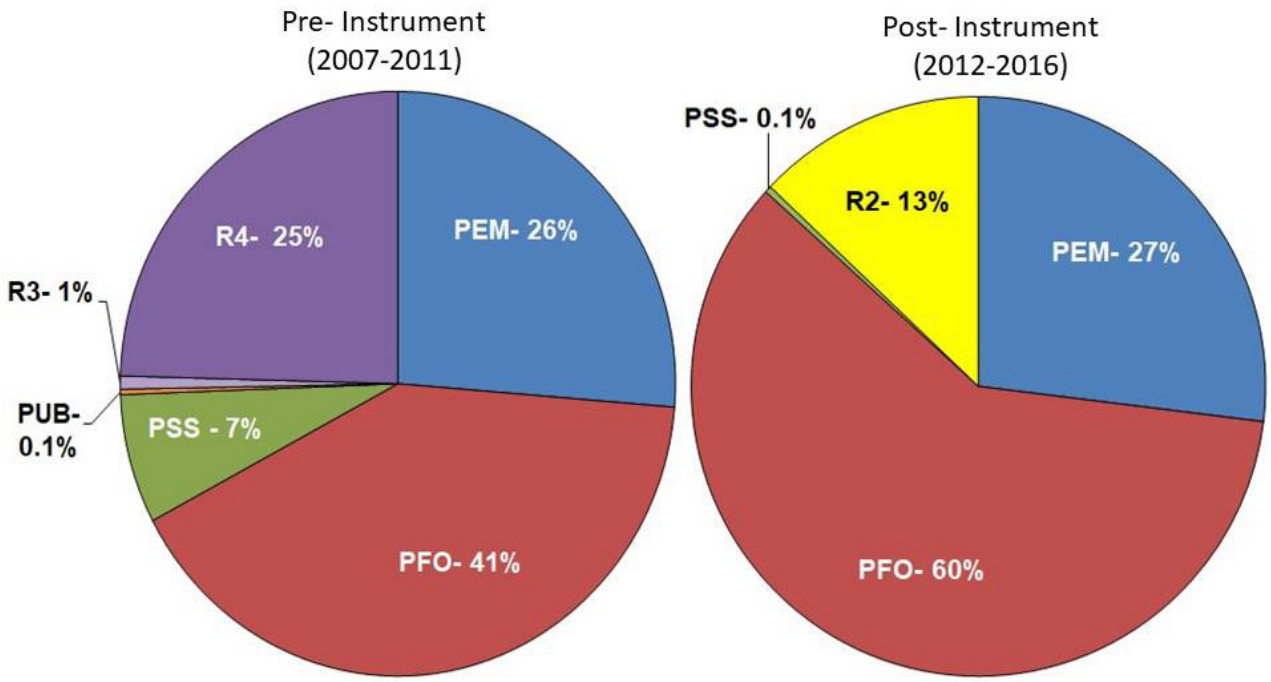
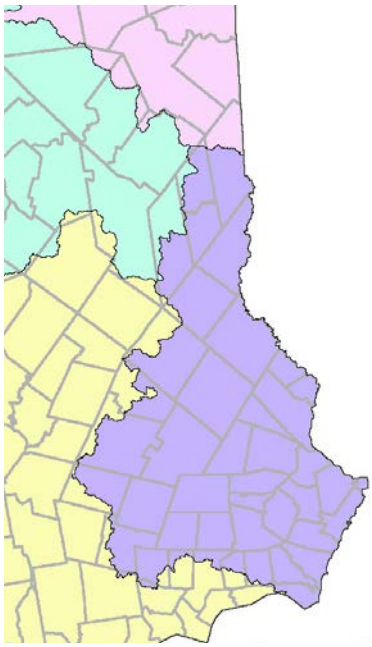


Figure 8 – Wetland impacts by Cowardin class.





Salmon Falls – Piscataqua Service Area

The Salmon Falls-Piscataqua service area is a moderately sized region at 531,544 acres, and encompasses the coastal zone of New Hampshire in the eastern portion of the state, bordering the Atlantic Ocean and Maine. A significant portion of the service area is developed (16%), has a high population density and the second highest population growth in the state. Over the past decade, there were nine permits issued Pre-Instrument and 25 Post-Instrument that required an ILF payment into the ARM Fund, totaling $3,267,686.88. The Salmon Falls-Piscataqua service area has been compensated for a total of 17.58 acres of permanent wetland loss, 134 linear feet of stream impacts, and 4.56 acres of secondary impacts from wetland conversion. During the Pre-Instrument period, payments were received for transportation, education, municipal and commercial projects. The largest Pre-Instrument payment was made in 2010 to compensate for 3.5 acres of forested and 3.5 acres of emergent wetland loss from a large transportation project involving the reconfiguration of 4 exits on a state highway. This project resulted in 21.5 acres total wetland loss, but in addition to the $1,235,319.12 ARM Fund payment, mitigation for this transportation project included 7.3 acres of constructed wetlands and 40 acres of upland buffer preservation. The University of New Hampshire lies within this service area and made payments in 2009 and 2010 to construct additional residence halls and associated parking, and to upgrade bike paths, parking lots and stormwater drainage on campus. The majority of payments during the Post-Instrument period were made for commercial and transportation projects. In 2014, a payment of $351,895.87 was made to compensate for 0.97 acres of estuarine impacts for bridge construction on a state highway. During 2015 and 2016, there were several commercial projects that involved dredging and filling a total of 2.33 acres of wetland and required $470,252.98 (Figure 9).

During both the Pre- and Post-Instrument periods, the majority of wetland impacts have been the loss of forested and emergent wetlands. During the Pre-Instrument period, there was loss of tidal riverine wetlands for a utility company to conduct maintenance dredging of0.03 acres a tidal river bottom. A total of 134 linear feet of stream impact required ILF for projects involving culvert replacements and catch basin installation. Post-Instrument, there was a 1.36-acre estuarine wetland loss that required ARM Fund payments for the construction of a road bypass and bridge project, road improvements and an extension to a 300-foot pier (Figure 10).

Salt marsh in Rye, NH – credit: Jen Drociak

Figure 9 – Payment into the ARM Fund by project type.

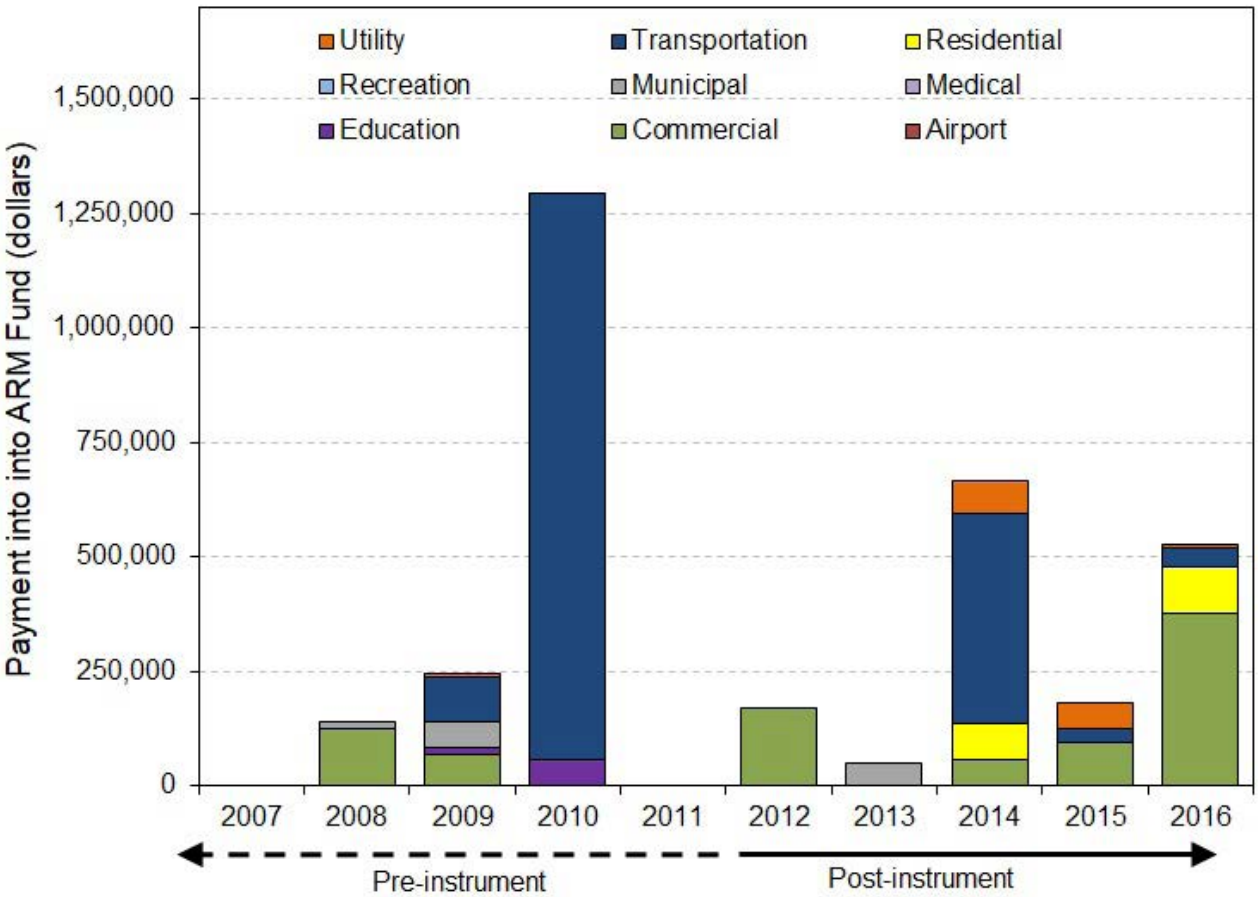
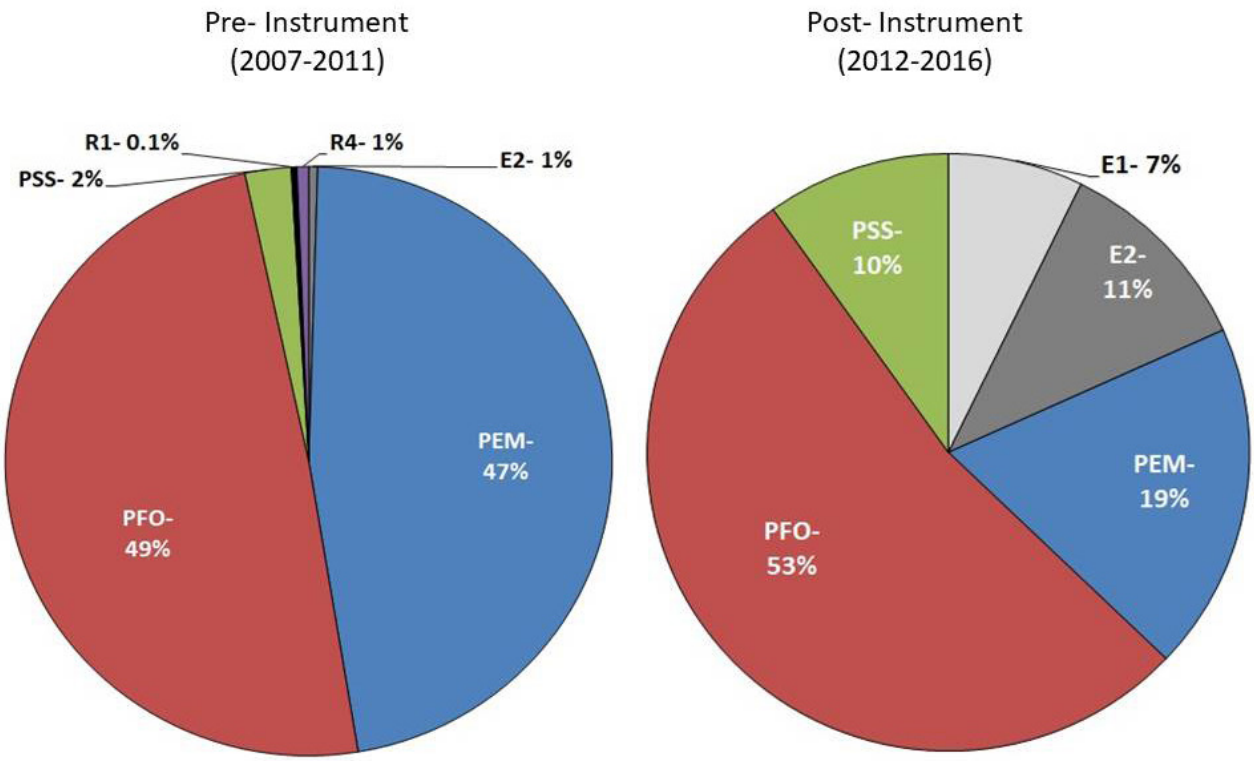
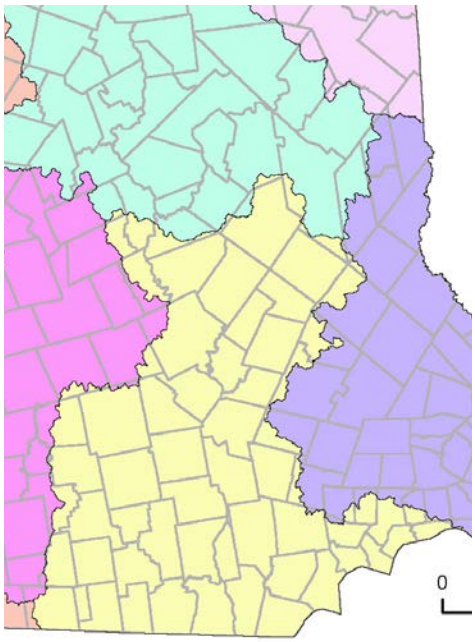


Figure 10 – Wetland impacts by Cowardin class.





Merrimack Service Area

The Merrimack service area is the largest in the state, covering 976,895 acres, and is located in the south-central portion of New Hampshire, bordering Massachusetts to the south. This region has the highest population density and is the fastest growing in the state. Currently, about 18% of the land has been developed and this is expected to increase, especially in areas focused along the Interate-93 corridor. Over the past decade, this service area has experienced the most aquatic resource impacts requiring ILF payments, including 45.26 acres of permanent wetland loss, 11,035 linear feet of stream impacts and 30.14 acres of wetland conversion, due in large part to the Interstate-93 expansion project. A total of $7,945,343.17 has been collected in ILF payment for 14 permits issued Pre-Instrument, and 28 Post-Instrument.

Overall, this service area has received payments for a high variability of project types – the largest being for airport, commercial, transportation and utility projects (Figure 11). In 2011, a large ILF payment was made to permit runway expansion at the Nashua Regional Airport, which resulted in 11.4 acres of emergent wetland and 0.23 acres of forested wetland loss. Pre-Instrument, there were several commercial projects permitted, including development of an industrial park, a Walmart and a retail space, which required compensation for 0.58 acres of emergent wetland and 1.52 acres of forested wetland losses, and 2.68 acres of conversion impacts. During the Post-Instrument period, transportation projects have consistently required ILF payments, especially in 2016, when several highway and municipal roadway projects were underway – the largest involving the Interstate-93 expansion. In 2013, the construction of a Park and Ride, a bridge widening/replacement and highway upgrades required $663,749 from NHDOT to compensate for 4.25 acres of forested wetland loss. In 2016, $1,823,239 was paid into the ARM Fund for 9.18 acres of emergent wetland and 0.40 acres of forested wetland losses, and 8,174 linear feet of stream impacts for activities related to widening Interste-93. A utility project involving 18 miles of transmission line resulted in 23 acres of wetland conversion, 17 linear feet of stream impacts and 0.12 acres of forested and scrub-shrub wetland losses, requiring a $646,875 ILF payment – additional mitigation in the form of conservation of 5.53 acres of land abutting the town forest was also provided.

Most of the wetland losses in the Merrimack service area have been to forested and emergent wetlands, with some shrub-scrub (Figure 12). There were perennial and intermittent riverine impacts during the Pre-Instrument period as a result of a large bridge replacement over an interstate highway and a smaller project to install a footbridge on the University of New Hampshire campus. Riverine wetland impacts that required ILF Post-Instrument were to compensate for 0.39 acres of intermittent stream bed permitted for a driveway culvert to access an apartment complex, and 0.10 acres of perennial bank during utility line relocation.

Brennan Brook, Francestown, NH

Figure 11 – Payment into the ARM Fund by project type.

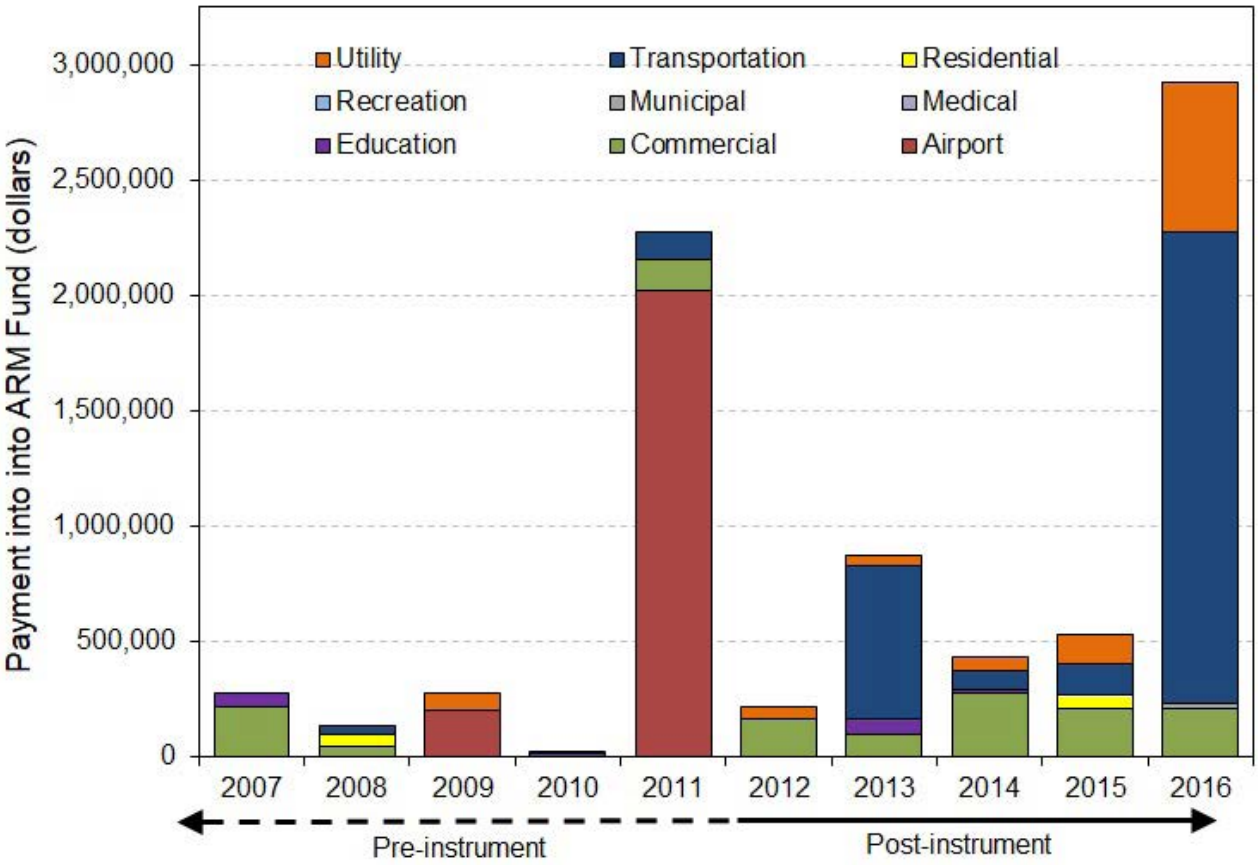
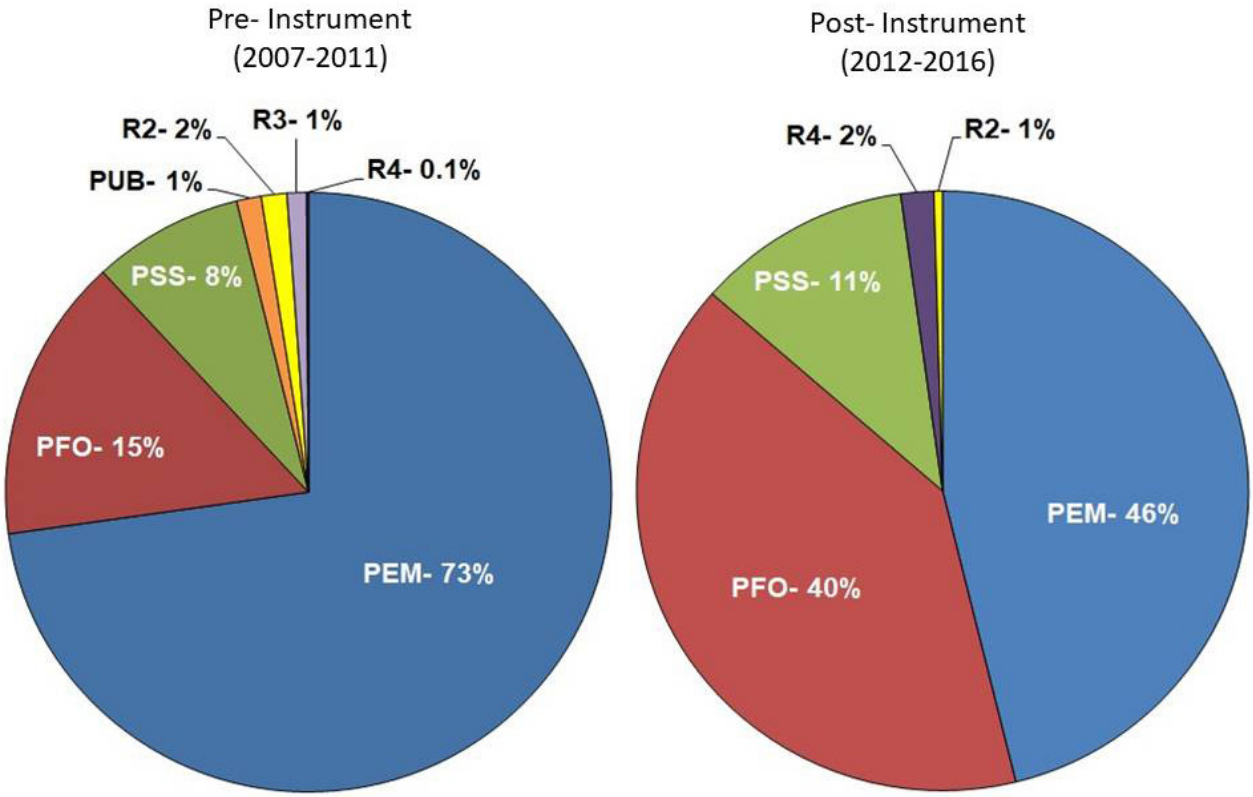
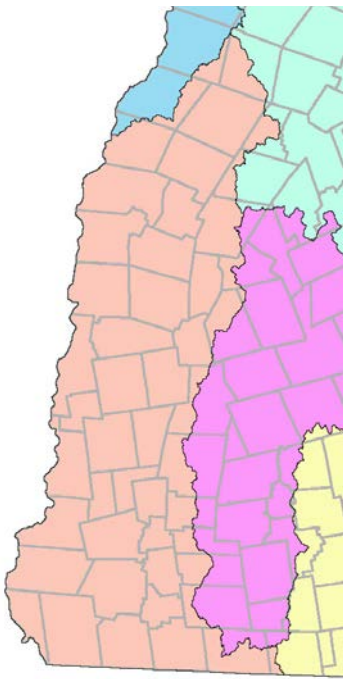


Figure 12 – Wetland impacts by Cowardin class.

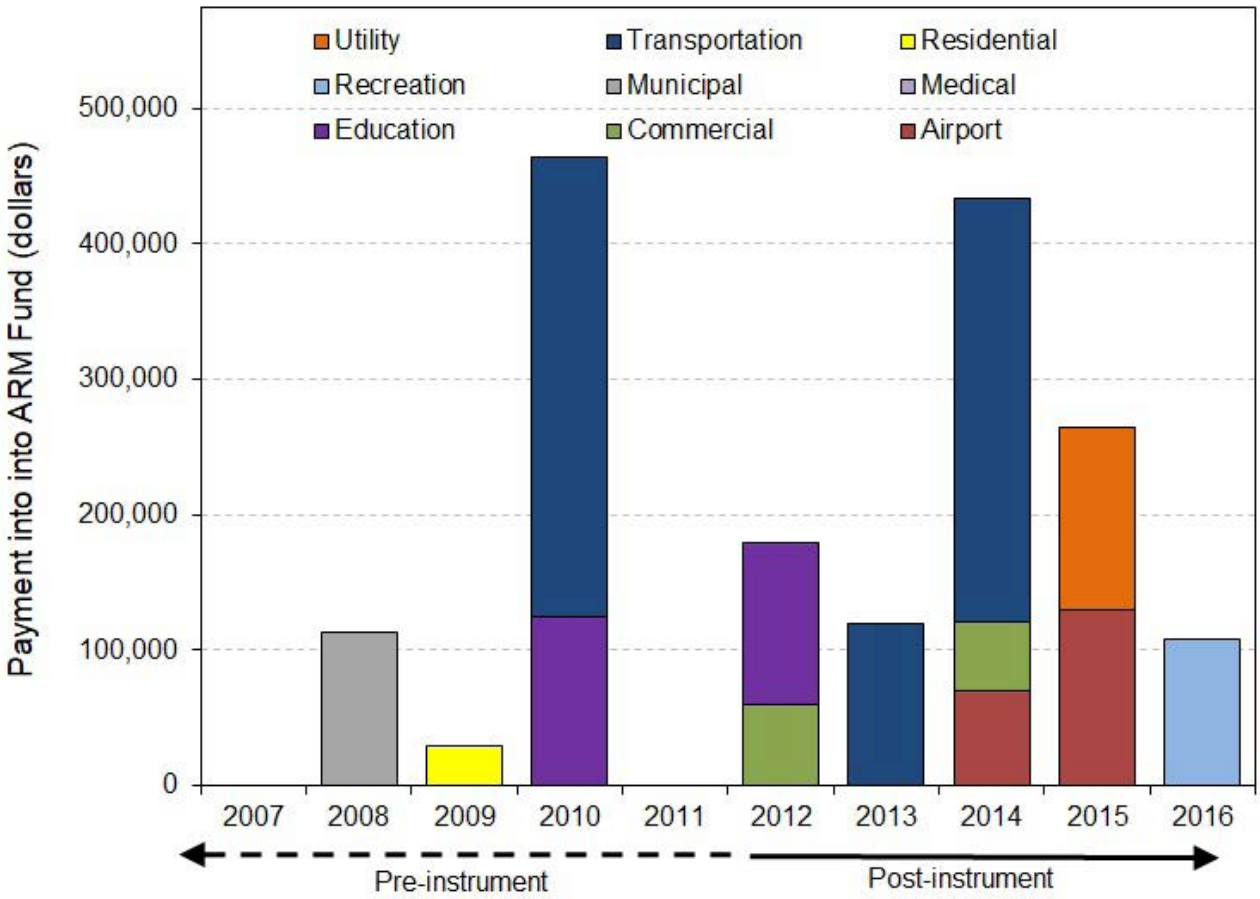




Lower Connecticut Service Area

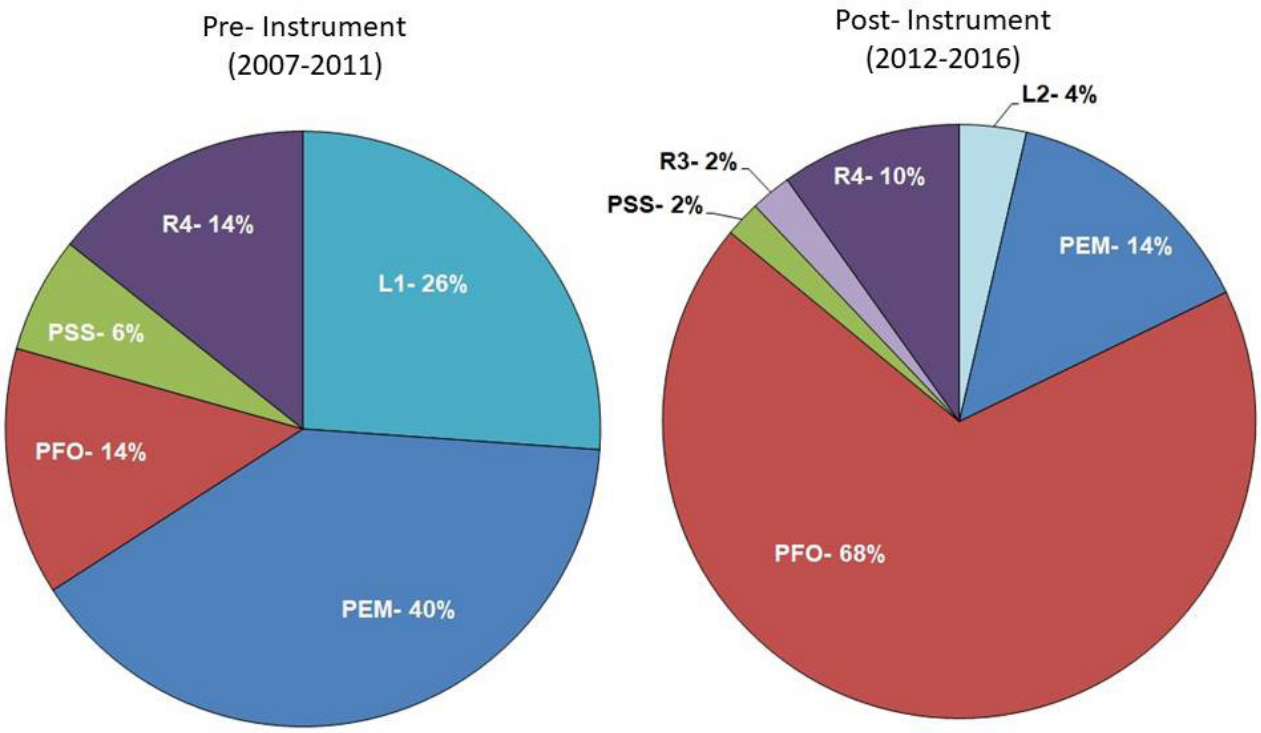
The Lower Connecticut service area is the third largest at 871,256 acres and is located in the southwestern portion of New Hampshire, bordering Vermont on the west. This region has moderate population density, 6% of the land has been developed and 80% is forested. Over the past decade, this service area has collected $1,711,785.67 into the ARM Fund to compensate for a total of 7.53 acres of permanent wetland loss, 746 linear feet of stream impacts and 12.83 acres of wetland conversion impacts. Pre-Instrument, there were five permits issued that required an ILF payment; 12 permits were issued Post-Instrument. Overall, this service area has received payments for a variety of projects, with the largest payments for transportation, education and airport projects (Figure 13). In 2008, a payment of $113,033.10 was made for a municipal project to construct a county corrections facility that resulted in 0.33 acres of emergent wetland and 0.52 of forested wetland losses. A transportation project to reconstruct several municipal roads in 2010 resulted in 2.64 acres of wetland loss and a $339,037.39 payment. Post-Instrument permits were issued for a variety of projects requiring ILF, with larger payments made for transportation, airport, utility and recreation projects (Figure 14). The largest payment was in 2014 by NHDOT for a bridge replacement on a state highway, which resulted in 0.36 acres of emergent and forested wetland impacts, and 404 linear feet of stream impacts. In 2014 and 2015, payments were made for two separate airport projects, one for 106 linear feet stream impacts from runway drainage improvements at the Keene Dillant-Hopkins Airport and a second for the Lebanon Municipal Airport to clear surrounding wetland vegetation.

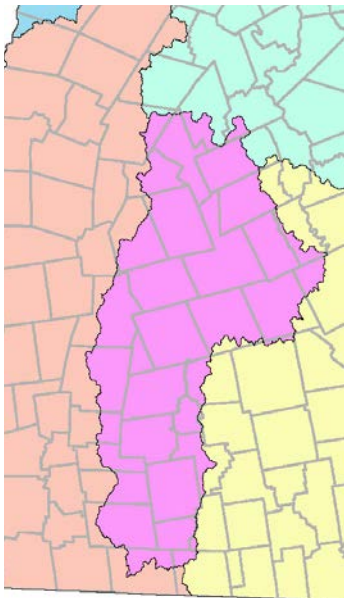
Figure 13 – Payment into the ARM Fund by project type.



Scott Pond wetland area, Fitzwilliam, NH

Figure 14 – Wetland impacts by Cowardin class.

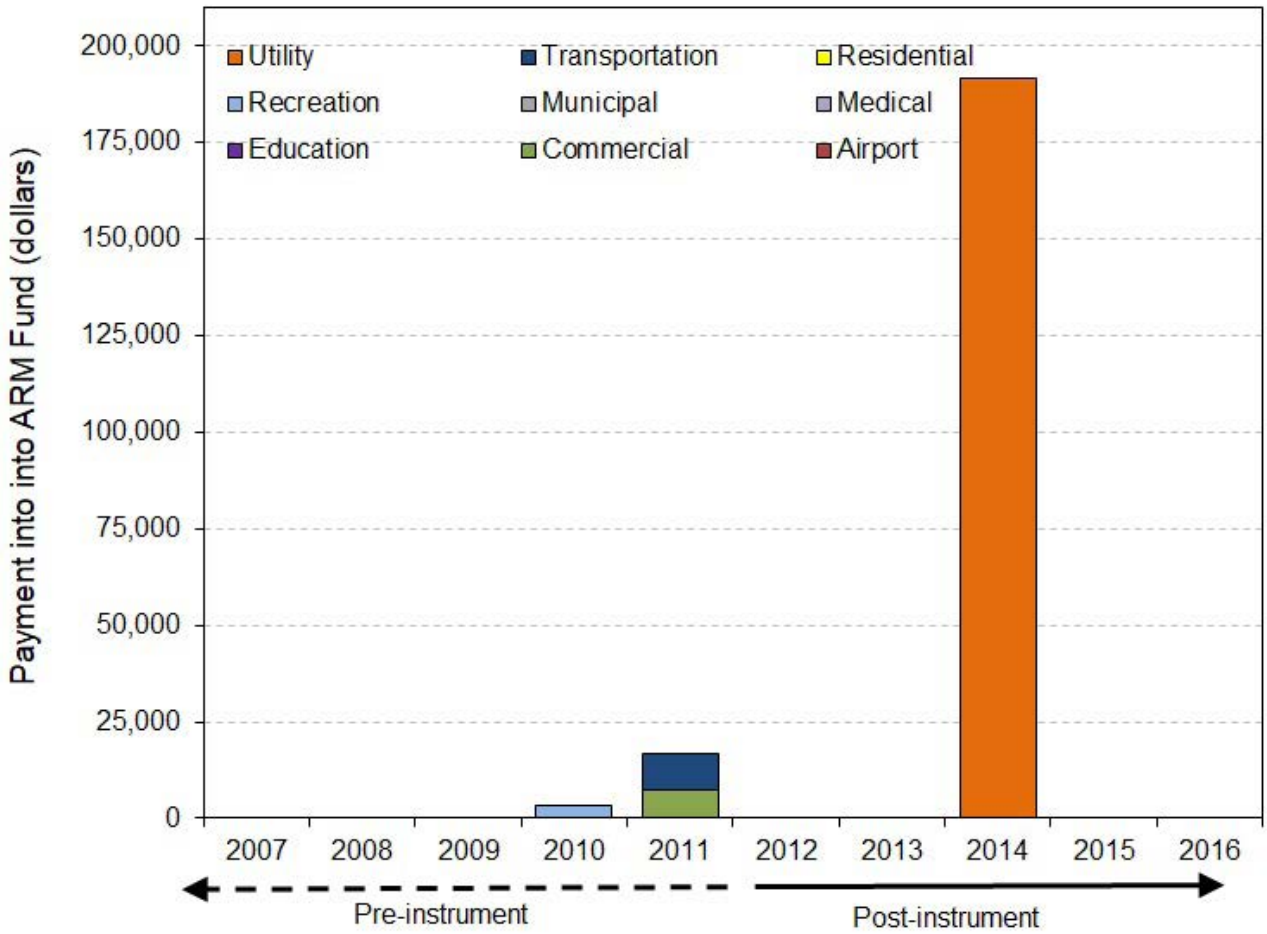




Contoocook Service Area

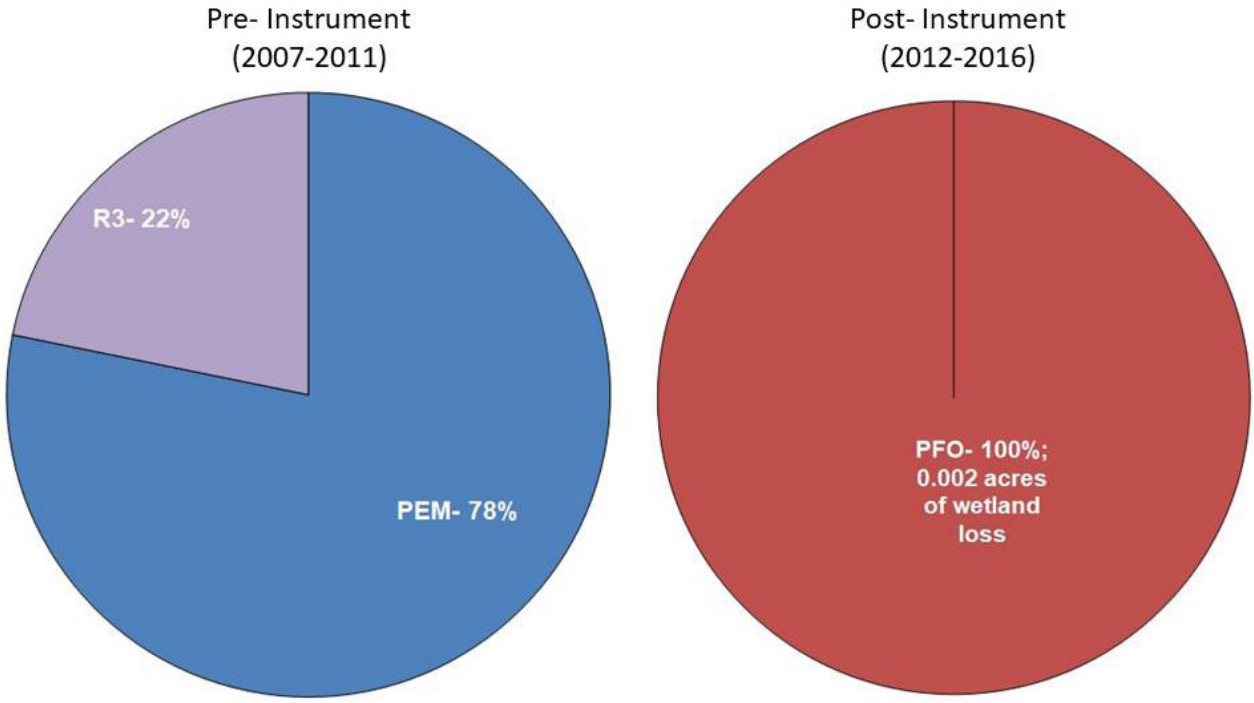
The Contoocook service area is located in the south-central portion of New Hampshire and is the second smallest ARM region at 489,022 acres. This region is significantly forested (79%) and 6% of land cover is currently developed. There were three permits issued Pre-Instrument, and one Post-Instrument that required compensatory mitigation, totaling $211,875.97 (Figure 15). Since 2007, the Contoocook service area has been compensated for 0.56 acres of permanent wetland loss, 78 linear feet of stream impacts and 9.36 acres of wetland conversion impacts. In 2010, a payment of $3,219.76 was made by the then New Hampshire Department of Resources and Economic Development to dredge and fill 0.51 acres of forested wetlands for construction of a year-round sports and recreation facility – although the facility was never built. In 2011, transportation projects impacted 78 linear feet of stream bank and channel, and 0.01 acres of riverine wetland along the Warner River for installation of a full-span bridge. The largest payment in the Contoocook service area was for reconstruction of a utility line, permitted in 2014, that converted 4.69 acres of forested and 0.44 acres of emergent wetlands, and of 3.24 acres of riverine wetlands (Figure 16).

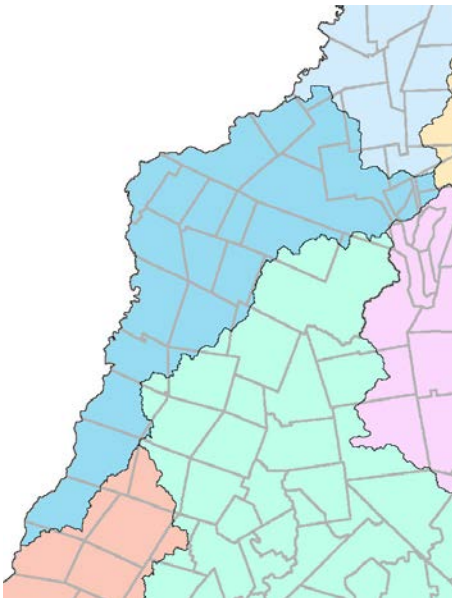
Figure 15 – Payment into the ARM Fund by project type.



Kimpton Brook beaver pond, Wilmot, NH – credit: Kathryn Michener

Figure 16 – Wetland impacts by Cowardin class.





Middle Connecticut Service Area

The Middle Connecticut service area covers 504,144 acres and is located in the Central-Western portion of New Hampshire, bordering Vermont on the West. This region has moderately-low population density and 5% of the land has been developed. This region experienced significant wetland losses due to historic conversions of wetlands for agricultural use. Nine permits were issued Pre-Instrument, and eight Post-Instrument, that required ILF payments totaling $778,986.98. Since 2007, the Middle Connecticut service area has been compensated for 4.14 acres of permanent wetland loss, 250 linear feet of stream impacts and 6.48 acres of wetland conversion impacts. Overall, this service area has received payments for the highest variability of project types (Figure 17). In 2007, there were two residential subdivision projects that paid to compensate for 0.61 acres of forested wetlands. A $90,000 payment was made in 2009 for 1.85 acres of shrub-scrub wetland losses for a regional airport, with additional mitigation for this project providing preservation of 18.5 acres. During the Post-Instrument period, the largest payments into the ARM fund were for utility and residential projects. The largest payment in the service area ($270,999.52) was made in 2015 for a utility project to relocate a transmission line which involved installing new utility poles and construction of a permanent access road. This project resulted in 1.11 acres of wetland loss, including emergent, forested, shrub-scrub wetlands, and a vernal pool and 4.5 acres of wetland conversion impacts.

Overall, most of the wetland losses in this service area have been to shrub-scrub, forested and emergent wetlands (Figure 18). There were intermittent and perennial riverine impacts Pre-Instrument as a result of wetland fill for a commercial motorsports venue in 2009. Stream impacts in the Middle Connecticut resulted from transportation projects (55 linear feet) to install new culverts and replace headwalls, and from a commercial project that impacted 195 linear feet of an intermittent stream, for the construction of an industrial facility.

Tucker Brook, Franconia, NH

Figure 17 – Payment into the ARM Fund by project type.

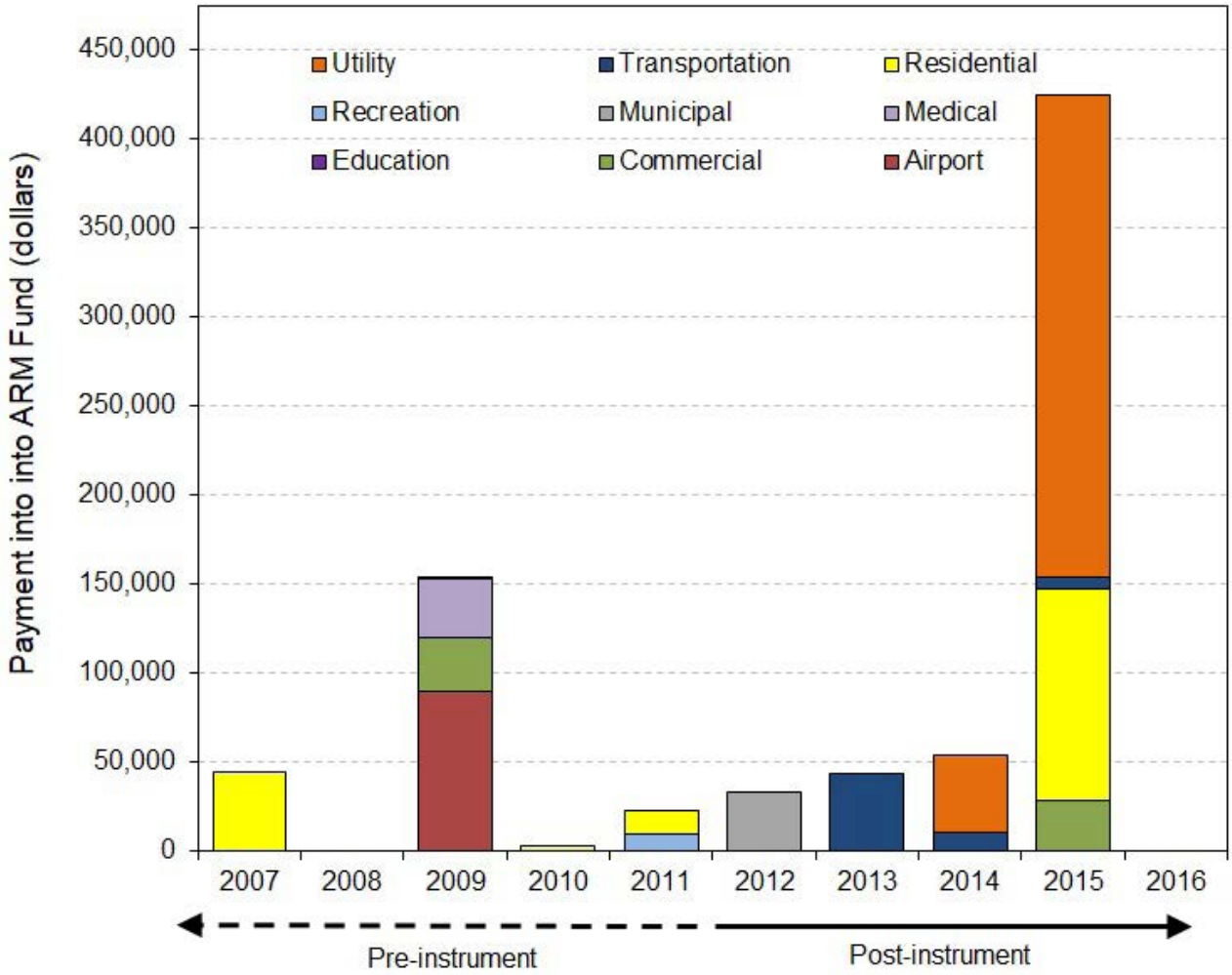
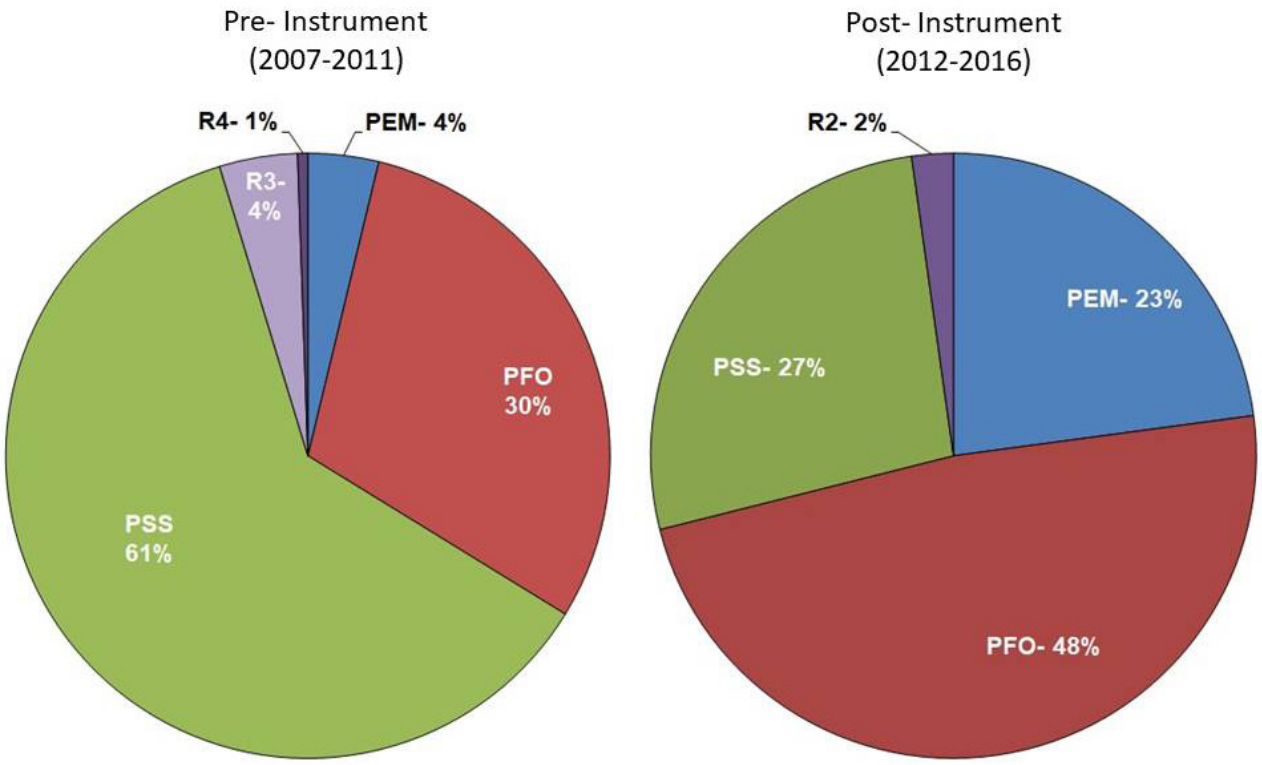


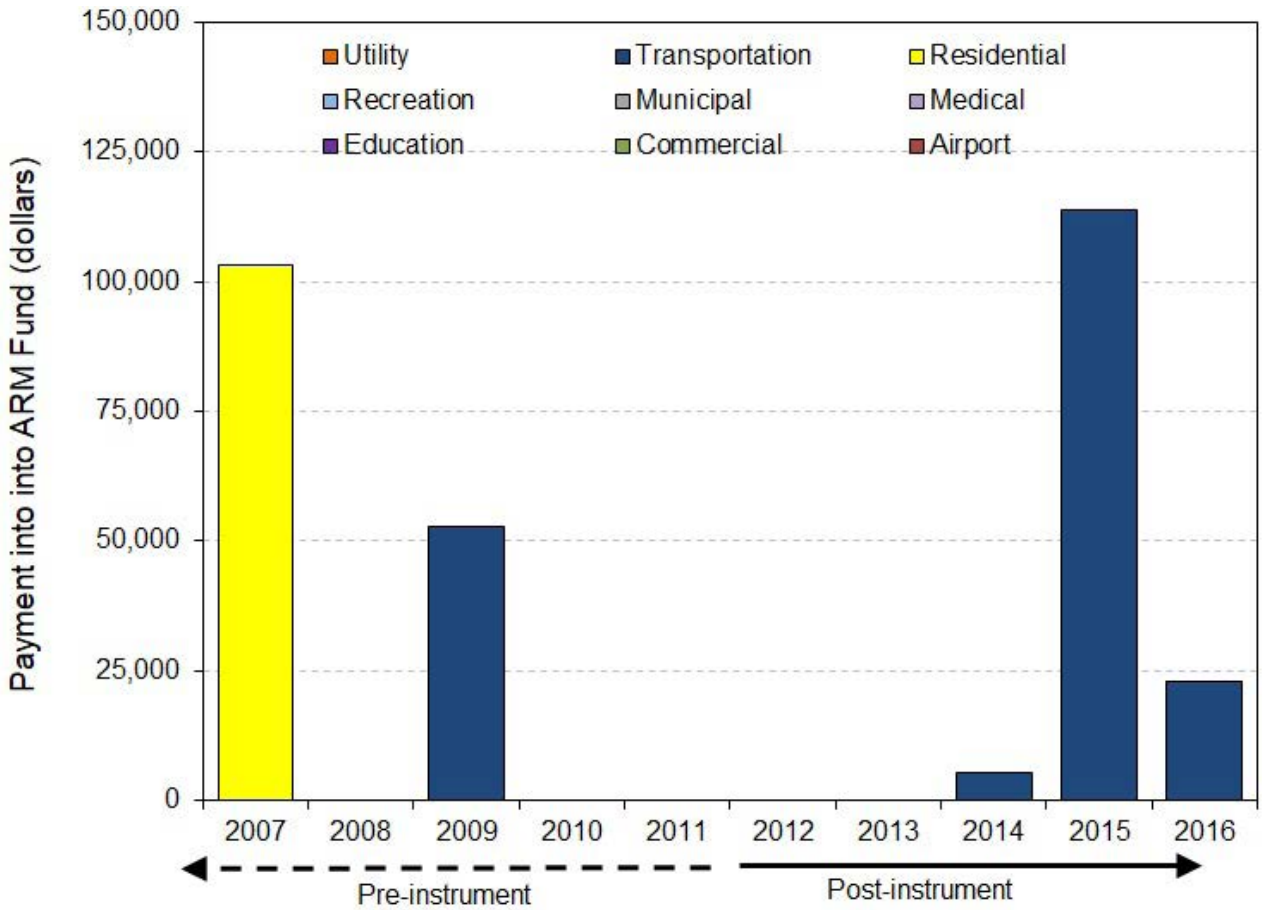
Figure 18 – Wetland impacts by Cowardin class.



Upper Connecticut Service Area

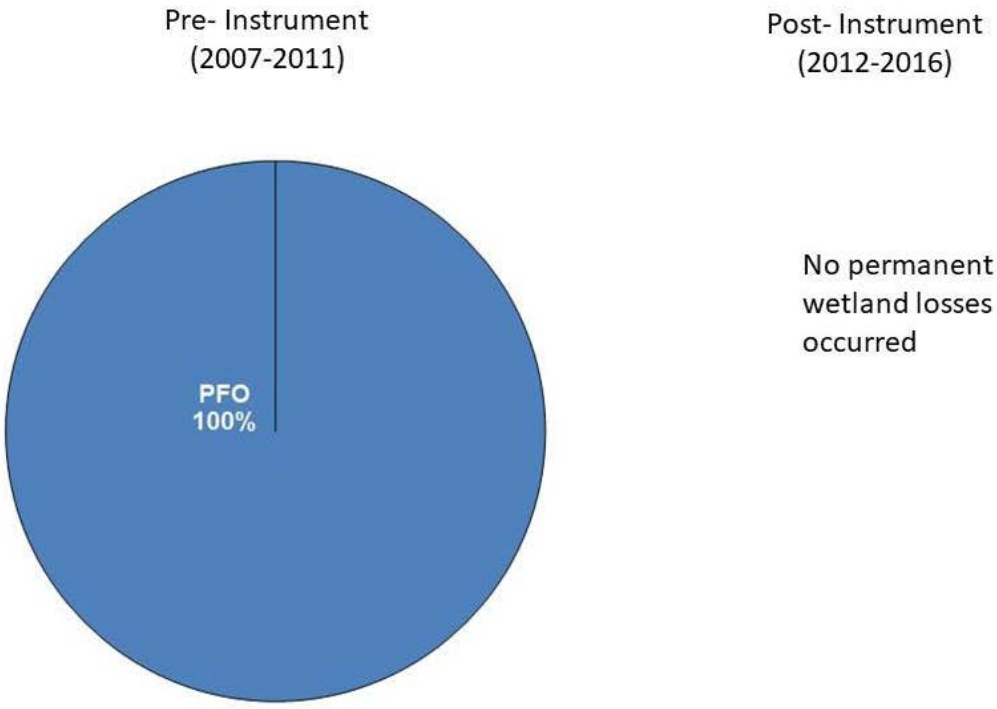
The Upper Connecticut service area is moderately sized, covering 583,305 acres, and lies within the northwest region of New Hampshire, bordering Vermont on the west and Canada to the north. This region is highly forested (87%) due to the large portions under conservation within White Mountain National Forest and Nash Stream Forest. The Upper Connecticut has the lowest population density of the nine service areas, with only 3% of land cover being developed. Over the course of a decade, the Upper Connecticut service area has been compensated for a total of 1.5 acres of permanent wetland loss and 230 linear feet of stream impacts — there have been no ILF payments made for secondary impacts from wetland conversion. There were only two permits issued Pre-Instrument, and three Post-Instrument, that required compensatory mitigation totaling $289,219.59. The largest payment into the ARM Fund Pre-Instrument was in 2007 for $103,226 to compensate for 1.0 acre of forested wetland loss for construction of a residential subdivision (Figures 19 and 20). The second payment during this time frame was a retroactive payment by NHDOT for $52,933.59 to compensate for impacts to 0.51 acres of forested wetland that were supposed to be mitigated with a conservation easement that was never obtained. During the Post-Instrument period, there were no wetland losses or conversion impacts that required ILF payments. All of the permits issued during this time frame were for stream impacts from transportation projects by NHDOT. These projects involved three stream crossings; two were total bridge replacements, and the third was to upgrade a metal pipe culvert to a 20-foot wide bridge.

Figure 19 – Payment into the ARM Fund by project type.



Pettyboro Road covered bridge over the Ammonoosuc River, Bath, NH – credit: Mary Ann Tilton

Figure 20 – Wetland impacts by Cowardin class.



Status and Trends of Program Objectives

The primary goal of the ARM Fund is to provide sustainable compensatory mitigation for functions and values of waters and wetlands of the U.S. that are lost due to authorized impacts. While restoration of wetland functions are preferred, due to the limited number of sustainable options, often preservation of upland buffers and enhancement projects are a large part of the program in New Hampshire.

The operation of the ARM Fund program has always relied on an advertisement of funds available in the form of grants.

The program has now established the submittal of a pre-proposal, which is due the last business day in April, and has set the full application deadline for last business day in August. The Site Selection Committee and IRT participate in the application review meetings, field inspections and evaluation discussions to provide recommendations for awards to be approved by the Wetland Council, ACE and, ultimately, the Governor and Executive Council. During the Pre-Instrument period, the ARM Fund distributed 18 awards and a total of $2,651,313 in the form of grants (Table 3). From 2012-2016, a total of $8,951,249 was distributed across 62 projects (Table 4).

Table 3 – Compensation projects awarded ARM funding (2007-2011).

Service Area	Number of Awards	Funds Awarded
Androscoggin	1	$89,000
Saco	0	$0
Pemigewasset - Winnipesaukee	4	$278,335
Salmon Falls - Piscataqua	7	$1,486,511
Merrimack	4	$566,000
Lower Connecticut	1	$83,467
Contoocook	0	$0
Middle Connecticut	0	$0
Upper Connecticut	1	$148,000
Total	**18**	**$2,651,313**

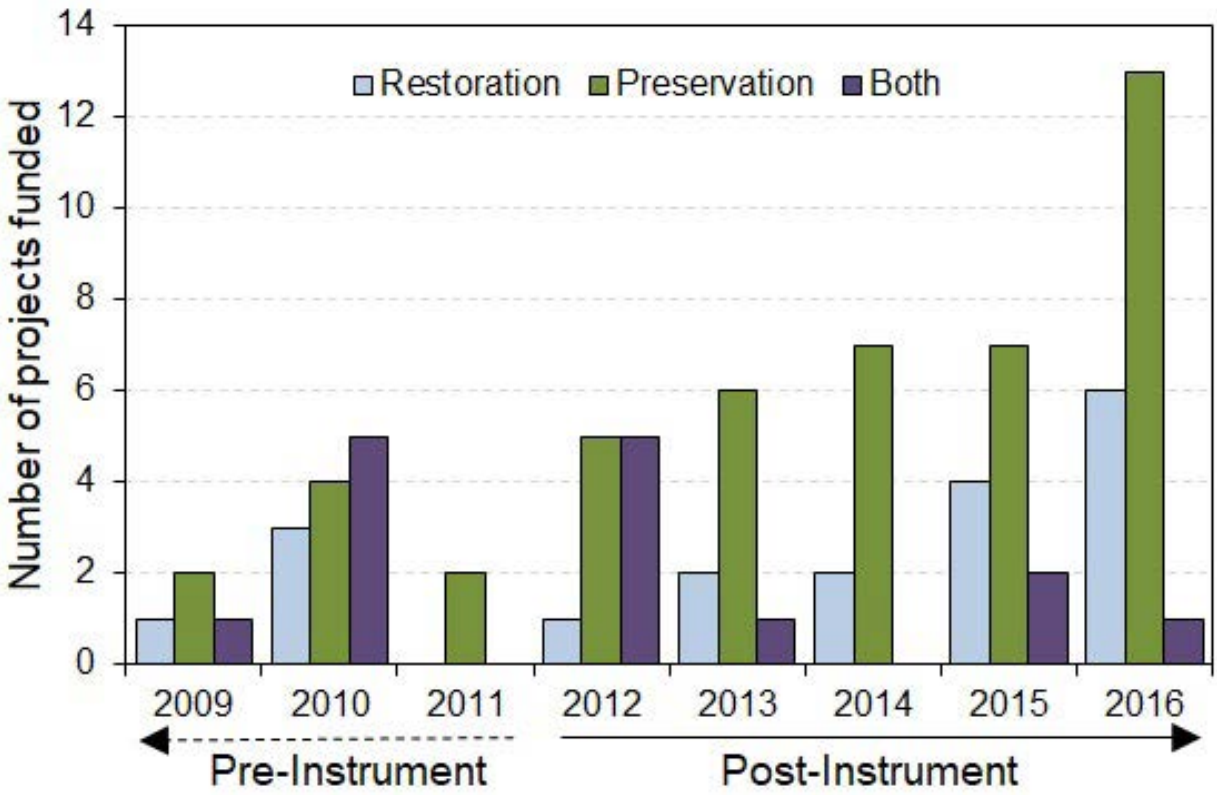
Loons on Grafton Pond, Grafton, NH – credit: Livy's Lens Photography

Table 4 – Compensation projects awarded ARM funding (2012-2017).

Service Area	Number of Awards	Funds Awarded
Androscoggin	1	$61,000
Saco	1	$46,000
Pemigewasset - Winnipesaukee	5	$545,236
Salmon Falls - Piscataqua	14	$1,154,960
Merrimack	22	$4,875,246
Lower Connecticut	8	$1,413,767
Contoocook	3	$189,000
Middle Connecticut	5	$566,240
Upper Connecticut	3	$99,800
Total	**62**	**$8,951,249**

The award projects vary in size, type, and complexity. The program has emphasized the goal for applicants to pursue restoration activities within the context of proposed conservation activities. Although the program has tended to award more upland buffer preservation projects overall, the program is on an upward trend to fund more restoration projects (Figure 21).

Figure 21 – Number and type of funded projects, Pre- and Post-Instrument.



New Hampshire's wetlands and streams provide important functions including flood control, water filtration and storage, recharge areas for ground and surface waters, and fish and wildlife habitat. A program improvement that was initiated in 2010 was a focus on stream resources. The stream crossing is the nexus between human infrastructure and the aquatic organism "infrastructure." Fish and wildlife rely on the continuity and connectivity of rivers and streams. Across New Hampshire, there are more than 19,000 road-stream crossings, some of which have created obstructions to the adequate passage of flow, sediment and fish. Unfortunately, undersized or failed culverts are often hidden and largely ignored as long as traffic flow is maintained, but can still be detrimental to fish and wildlife species in the watercourse. Often, only when culverts fail or water overtops the road, causing serious impediments to local transportation, are they a focus of concern; however, many of these culverts have been failing the ecosystem for much longer.

Work to improve and restore wetland and stream ecosystem function is an important conservation focus and is an investment for the future of many species. In addition to creating barriers to fish and reducing the amount of habitat they have access to, stream crossings can be barriers to other wildlife. For example, the Blanding's turtle has been highlighted in the New Hampshire Fish and Game Department (NHFG) Wildlife Action Plan (WAP)[3] as increasingly imperiled due to road mortality and increase in habitat loss and fragmentation through stream alteration. Four of the seven species of New Hampshire's turtles (Blanding's turtle, spotted turtle, wood turtle and box turtle) were identified as species in greatest need of conservation. Rapid development and land conversion contributes another stressor to already vulnerable aquatic species that are challenged by existing crossings that do not maintain appropriate flow, lack proper substrate and often constrict a stream.

The NHDES mitigation program work has advanced over the years on coordinating efforts to identify which crossings would be most beneficial to replace or modify based on infrastructure needs and habitat improvement. NHDES staff developed technical materials and outreach events for grant applicants that specify key items to be addressed in project applications. By prioritizing habitat improvement within roadway projects, combined with flood risk areas, public safety needs are addressed while improving the conditions of stream habitat and reconnecting critical pathways for aquatic organisms. Strategic prioritization of wetland and stream crossing replacement opportunities throughout the state will improve environmental quality and habitats critical to species of conservation focus.

Eastern brook trout

In the previous 10 years, the ARM Fund has been one of the most effective programs for efficiently implementing the WAP (e.g., land protection, wetland and stream restoration). NHFG and the New Hampshire Natural Heritage Bureau (NHB) participate on the NHDES ARM Fund Site Selection Committee, providing critical technical input on wildlife, plant and natural community resources. NHFG recognizes the goal to work with the NHDES mitigation program to strengthen restoration projects, and with the agricultural community to implement nutrient management programs that protect water quality in wetlands, streams, rivers, lakes and ponds. The site selection committee works to maximize effectiveness of WAP implementation and the next summaries are examples of this effective partnership.

[3]New Hampshire Wildlife Action Plan, 2015. https://www.wildlife.state.nh.us/wildlife/wap.html.

Blanding's Turtle Conservation Focus

There are seven species of turtles that are considered native to New Hampshire. Box turtles are considered native, although no populations (multiple individuals from one site) are known at this time. Some species, such as painted and snapping turtles, are relatively common and widespread across the state, whereas the Blanding's turtle is becoming increasingly imperiled. The Blanding's turtle is ranked as State Endangered and is a WAP Species in Greatest Need of Conservation. This species is legally protected in New Hampshire and the possession, sale, import and take (harm, harass, injuring, killing) is illegal.

Blanding's Turtle (Emydoidea blandingii) is a 7- to 9-inch turtle with yellow speckles and a characteristic yellow throat and chin. Credit: NHFG

This critically imperiled (S1) wildlife species is found in wetland habitats with permanent shallow water and emergent vegetation such as marshes, swamps, bogs and ponds. Blanding's turtles use vernal pools extensively in the spring and while traveling through the landscape, and may use slow rivers and streams as mechanisms for dispersal between wetlands.

Blanding's turtle focus areas were developed under a partnership among the wildlife agencies in the northeastern states, along with other conservation partners. The prioritization process is described in detail within the *Conservation Plan for the Blanding's Turtle and Associated Species of Conservation Need in the Northeastern United States*[4]. The goal of the Northeast Blanding's turtle Conservation Strategy is to maintain functioning, viable populations of Blanding's turtles throughout their known range in the northeastern U.S. and representative of all major, extant ecological and genetic lineages (i.e., Ecologically Significant Units [ESUs]) defined by genetic, physical and ecological boundaries. In the 2007 Status Assessment, Compton (2007) notes that because road kill and habitat loss are two of the major threats facing Blanding's turtles in the region, the protection of large, intact landscapes is important for their long-term conservation.

A Conservation Area Network (CAN) was designed to select high priority sites as conservation targets (to focus land acquisition and management actions) and to ensure representation, redundancy and resilience of Blanding's turtle populations across the Northeast. These sites are supported by a network of other known sites and suitable habitat that facilitate connectivity between high priority sites. High priority sites were selected based upon population size (or relative results of standardized sampling), landscape context, genetic distinctiveness and regional representativeness.

In addition, the CAN was designed so that there was replication at each ESU throughout the region, where feasible, and high-priority sites were allocated proportional to habitat area in the Northeast as closely as possible.

Many of the guidelines and land conservation priorities developed for Blanding's turtles are relevant to spotted turtles as well, but spotted turtle-specific guidelines should be developed for landowners, managers and towns to enhance and protect resources important to the species. Priority sites will be incorporated into WAP revision maps and incorporated into state land conservation funding consideration. NHFG staff will provide technical

[4]Willey and Jones, 2014. Conservation Plan for the Blanding's Turtle and Associated Species of Conservation Need in the Northeastern United States. http://www.blandingsturtle.org/uploads/3/0/4/3/30433006/embl_compswg_plan_sept30_2014.pdf.

assistance to land trusts and towns in identifying and conserving priority parcels. NHFG staff will also provide technical assistance in developing management objectives compatible with spotted turtle conservation. The species has been targeted for management on some lands protected by groups such as the Great Bay Partnership and Southeast Land Trust.

All of the Blanding's turtle conservation focus areas are in the Merrimack and Salmon Falls-Piscataqua service areas. A total of 25 projects have been funded in the Merrimack River service area, totaling 6,810 acres of protected and/or restored land, of this, 2,908 acres were in a tier 1 or 2 Blanding's focus area. One project in the Merrimack River service area was completed prior to 2012 and the completion of the CAN, but was reviewed according to the focus area and is included in the summary. A review of the 20 projects funded in the Salmon Falls area notes 2,833 acres were protected and/or restored with seven projects in the conservation focus area resulting in 872 acres funded (Table 5).

Crooked Run Preservation and Restoration Project
Barnstead, Pittsfield and Strafford, NH

Table 5 – ARM projects that overlap Blanding's turtle regional focus areas.

Project Name	Town	Service Area	Preservation Restoration or Both	Parcel (acres)	Blandings Focus Area TIER 1 (acres)	Blandings Focus Area TIER 2 (acres)
Clay Pond	Hooksett	Merrimack	Preservation	544.0	544.0	0
Hinman Pond	Hooksett	Merrimack	Preservation	470.4	470.4	0
Crooked Run	Barnstead, Pittsfield, Strafford	Merrimack	Both	587.5	0	206.5
Hinman Pond II	Hooksett	Merrimack	Preservation	199.7	199.7	0.0
Shost Conservation Easement	Goffstown	Merrimack	Preservation	177.2	0	7.7
Mathes Property	Londonderry	Merrimack	Preservation	151.1	150.2	0
Tower Hill Pond (Manchester Water Works)	Candia & Hooksett	Merrimack	Preservation	2135.2	0.8	1329.0
Calef Isinglass River	Barrington	Salmon Falls-Piscataqua	Preservation	268.5	0	268.5
Spruce Swamp: Kelliher Forest Addition	Fremont	Salmon Falls-Piscataqua	Preservation	36.3	36.3	0.0
Horsburgh Property	Fremont	Salmon Falls-Piscataqua	Preservation	327.4	327.4	0.0
Rollins Brook Headwaters (Zanard)	Nottingham	Salmon Falls-Piscataqua	Preservation	64.9	0.0	64.9
Isinglass River Floodplain Protection (Barr)	Barrington	Salmon Falls-Piscataqua	Preservation	53.1	0.0	53.1
Upper North Branch River	Candia	Salmon Falls-Piscataqua	Preservation	121.3	121.3	0.0
Pre-Instrument				**544.0**	**544.0**	**0**
Post-Instrument				**4,592.8**	**1,306.1**	**1,929.7**
Total Blanding's turtle Focus Area conserved				**5,136.8**	**1,850.1**	**1,929.7**

New England Cottontail Focus

Since 1960, the distribution and abundance of New England Cottontail (NEC) has declined substantially throughout New England. NEC was identified as a "candidate" species for federal listing in 2006 by the United States Federal Wildlife Service (USFWS). In September 2015, USFWS determined NEC was not warranted for federal listing due to the conservation measures effectively being implemented for its recovery.

The New England cottontail (Sylvilagus tranisitionalis) is a small (15-17 inches) rabbit with a brown and gray coat, and often a black spot between and along the edge of the ears. Credit: NHFG

Decline of NEC was estimated at approximately 14% of historic range. This included substantial decline within the occupied portions of New Hampshire, with only eastern cottontails and snowshoe hares found in the western portion of the state.

New England cottontails occupy a variety of habitats, including native shrublands and regenerating forests associated with small-scale disturbances that result from beavers, local windstorms and human land uses. Less frequent but larger-scale disturbances (including hurricanes and wild fires) also provide early-successional habitats, especially near the Atlantic coast. Focus areas for management efforts were identified within the state as part of the Conservation Strategy for the New England Cottontail[5].

Habitat management and population goals for the species were identified for each focus area, and targeted actions were developed to accomplish these goals. Since 2009, over 950 acres of public and private lands have been managed for the species within the focus areas. In addition, a regional captive breeding program was initiated in 2011 and population augmentation began in 2013. Over the past decade, the ARM Fund has supported seven projects that are in the NEC focus area, totaling 633.8 acres that will conserve or restore habitat the for the species (Table 6). The ARM program will continue to work on supporting NEC population recovery efforts with NHFG staff and identify projects that conserve or restore NEC habitat during the site review process.

[5]Fuller and Tur. 2012. Conservation Strategy for the New England Cottontail (Sylvilagus transitionalis). https://newenglandcottontail.org/sites/default/files/conservation_strategy_final_12-3-12.pdf

Table 6 – ARM projects that overlap New England cottontail regional focus areas.

Project Name	Town	Service Area	Preservation Restoration or Both	Parcel (acres)	NEC Focus Area (acres)
Nesenkeag Brook	Londonderry	Merrimack		16.9	16.9
River Road	New Castle	Salmon Falls-Piscataqua	Restoration	0.9	0.9
Sprucewood Forest	Durham	Salmon Falls-Piscataqua	Preservation	172.4	172.4
Pennichuck Brook	Merrimack	Merrimack	Both	117.0	60.5
Cutts Cove	Portsmouth	Salmon Falls-Piscataqua	Restoration	2.6	2.2
Powder Major's Farm and Forest	Durham, Lee & Madbury	Salmon Falls-Piscataqua	Preservation	229.8	229.8
Mathes Property	Londonderry	Merrimack	Preservation	151.1	151.1
Total New England Cottontail Focus Area conserved				**690.6**	**633.8**

Rare Species (plants and other animals) Focus

As previously noted, NHDES holds and manages funds to be offered as grants for potential projects that will accomplish long-term environmental results. These projects must consider the service area goals and replace and/or protect wetland and other aquatic resource functions and values that were impacted by development projects in the service area. The proposed project will score highest if it provides resource restoration within the context of a protected buffer. NHDES encourages projects that provide connectivity to other protected resources or are in close proximity to the wetland impacts. A key component for every project is the opportunity to protect and enhance rare resources such as exemplary natural communities, threatened or endangered plant and wildlife species, and vernal pool complexes, to maintain the important functional roles these unique species and habitats play in local ecosystems.

There are about 89 current/relevant NHB/NHFG records that overlap a total of 37 ARM sites. There could be many more records that are adjacent to the properties that would not have been captured by this analysis. This equates to about 46% of ARM sites having rare species present or in the vicinity of the project.

Vernal Pool Focus

A vernal pool is a temporary body of water (wetland) that provides essential breeding habitat for certain amphibians and invertebrates. These unique wetlands typically cycle annually from flooded to dry. Vernal pools vary in size, shape and location, and are important as wildlife habitat because of the wide range of species that use them, including turtles, frogs, salamanders, fairy shrimp, clam shrimp, fingernail (or “pill” or “pea”) clams, caddis flies and other aquatic insects. Some of these species (certain invertebrates, salamanders and frogs) are rarely found outside of areas containing vernal pools.

In addition to being vital as small, individual habitats for local plants and animals, vernal pools fill another important role. If we think of them as specialized aquatic stepping stones within a larger habitat type, we see that groups of pools form “corridors” of wetland habitat, along which wildlife may travel. If the corridors do not exist, these creatures will be isolated and more vulnerable to drastic changes in their surroundings. These factors make the pools and surrounding uplands important habitat for the wildlife of New England. Because of the importance of vernal pools to a variety of wildlife species, they are included as a critical habitat type in the WAP.

The ARM Fund program revised the application materials to specifically request information on projects that may contain vernal pools. Some information was provided in the projects from the 2013 grant round and the requirements were formalized in the 2014 application materials. For the four grant rounds in which this information has been requested (2013-2016), 85 projects contain confirmed vernal pools and 195 potential vernal pools were noted on parcels. The program will continue to collect this information as part of each grant round.

Vernal pool in Bow, NH. Credit: NHDES

Conditions and Objectives in the Nine Service Areas

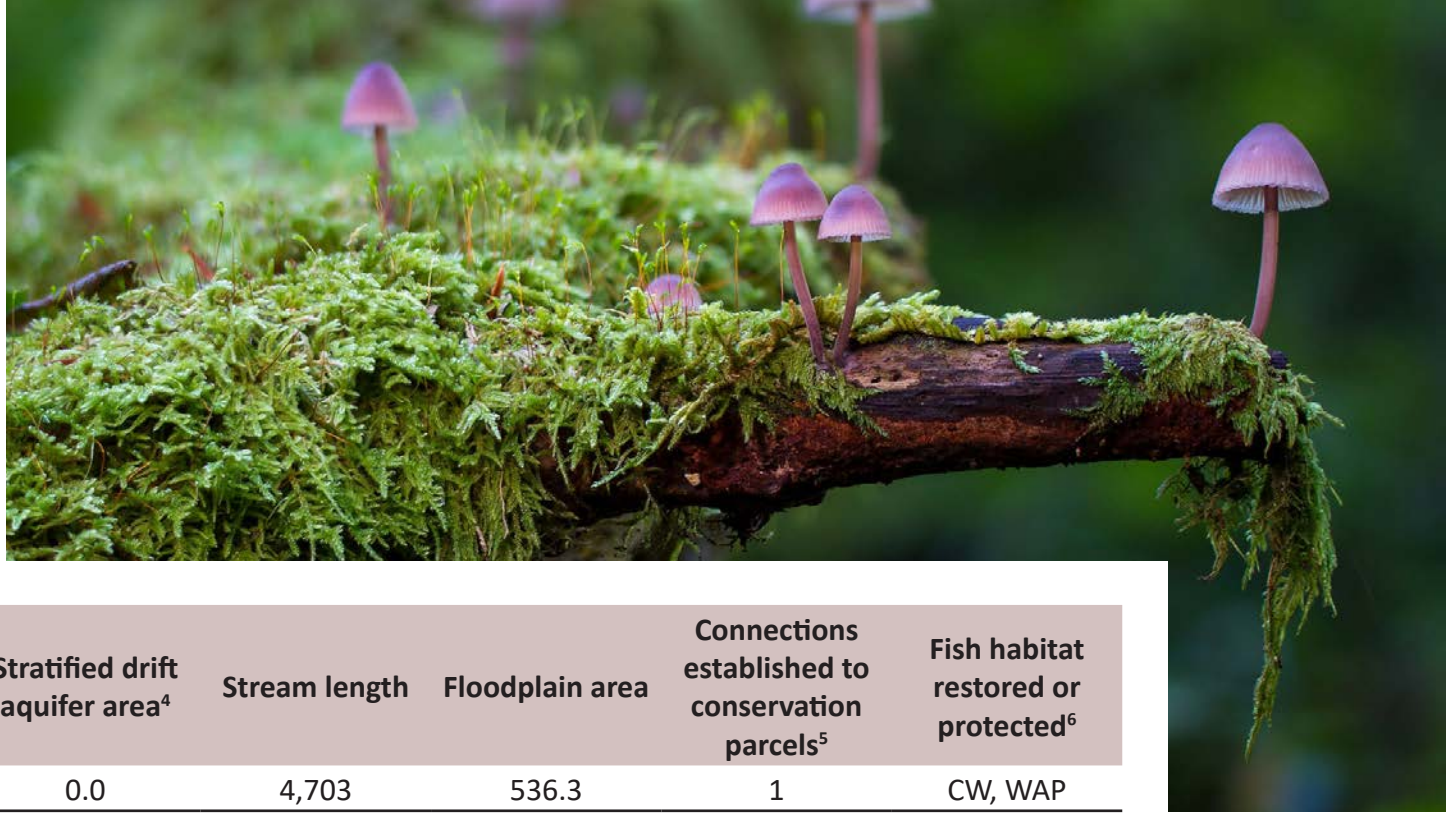
The 2012 Program Instrument includes a comprehensive section on the resources used to develop the compensation planning framework. The compensation planning framework will be updated in the 2022 report. A status of the objectives and details of how the awards have met these objectives is included in this five-year report for each service area. The Program will continue to refer to these objectives with the goal to fund projects that meet or exceed these objectives through future grant rounds. Tables 7 and 8 provide a summary of program accomplishments by the total amount of upland (acres) and aquatic (linear feet) habitat types conserved, conservation parcels connected and source water quality areas protected by the ARM Fund. A summary for each Service Area is noted in the following section and a brief description of each project award is provided in Appendix B.

Table 7 – Pre-Instrument Summary (2006-2011) of ARM Fund Awards.

Service Area	Total land conserved	WAP Tier 1[1]	WAP Tier 2[1]	WAP Tier 3[1]	Source water protection[2]	Well head protection[3]
Androscoggin	1,210.4	811.4	30.8	368.2	0.0	0.0
Contoocook	0.0	0.0	0.0	0.0	0.0	0.0
Lower Connecticut	299.0	199.5	42.6	47.4	5.2	0.0
Merrimack	905.2	627.9	73.2	143.1	905.2	0.0
Middle Connecticut	0.0	0.0	0.0	0.0	0.0	0.0
Pemigewasset	237.7	67.8	47.5	36.1	237.7	113.1
Saco	0.0	0.0	0.0	0.0	0.0	0.0
Salmon Falls	1,540.4	1,148.4	283.8	91.8	961.9	173.7
Upper Connecticut	73.5	0.3	9.9	23.9	73.5	0.0
Total	**4,266.1**	**2,855.3**	**487.7**	**710.6**	**2,183.5**	**286.8**

Table 8 – Post-Instrument Summary (2012-2017) of ARM Fund Awards.

Service Area	Total land conserved	WAP Tier 1[1]	WAP Tier 2[1]	WAP Tier 3[1]	Source water protection[2]	Well head protection[3]
Androscoggin	7.6	0.0	3.4	3.4	0.0	7.6
Contoocook	574.4	85.6	81.7	63.7	574.4	2.6
Lower Connecticut	1,895.8	223.0	212.8	1,156.7	1,237.1	100.0
Merrimack	5,904.4	1,615.1	1,315.1	1,728.4	5,302.6	266.5
Middle Connecticut	567.9	74.4	34.7	154.6	567.9	27.4
Pemigewasset	875.3	255.8	219.2	257.1	875.3	0.0
Saco	994.3	97.6	316.7	572.7	0.0	0.0
Salmon Falls	1,292.5	456.4	424.5	350.8	659.9	183.9
Upper Connecticut	613.8	392.7	50.8	141.3	613.8	0.0
Total	**12,726.0**	**3,200.6**	**2,658.8**	**4,428.6**	**9,831.0**	**587.9**



Stratified drift aquifer area[4]	Stream length	Floodplain area	Connections established to conservation parcels[5]	Fish habitat restored or protected[6]
0.0	4,703	536.3	1	CW, WAP
0.0	0	0.0	0	None
0.0	3,579	85.1	1	CW
3.1	12,613	360.4	3	CW, DIA
0.0	0	0.0	0	None
199.7	0	230.3	2	CW, WAP
0.0	0	0.0	0	None
34.4	3,660	194.4	5	CW, WAP, DIA
16.0	0	72.5	1	None
253.1	**24,555**	**1,479.0**	**13**	

Stratified drift aquifer area[4]	Stream length	Floodplain area	Connections established to conservation parcels[5]	Fish habitat restored or protected[6]
0.0	0	7.2	3	None
0.0	3,778	116.7	6	CW
11.8	22,164	480.7	18	CW, WAP
232.6	73,508	2,377.5	3	CW, DIA, WAP, NHFG
21.2	5,032	176.2	4	CW, WAP, NHGF
2.3	9,505	199.2	1	CW
0.0	23,149	141.4	7	CW
0.0	12,223	443.0	3	CW, DIA, WAP, NHFG
0.0	5,679	435.1	4	CW, WAP, NHFG
267.9	**155,038**	**4,377.0**	**45**	

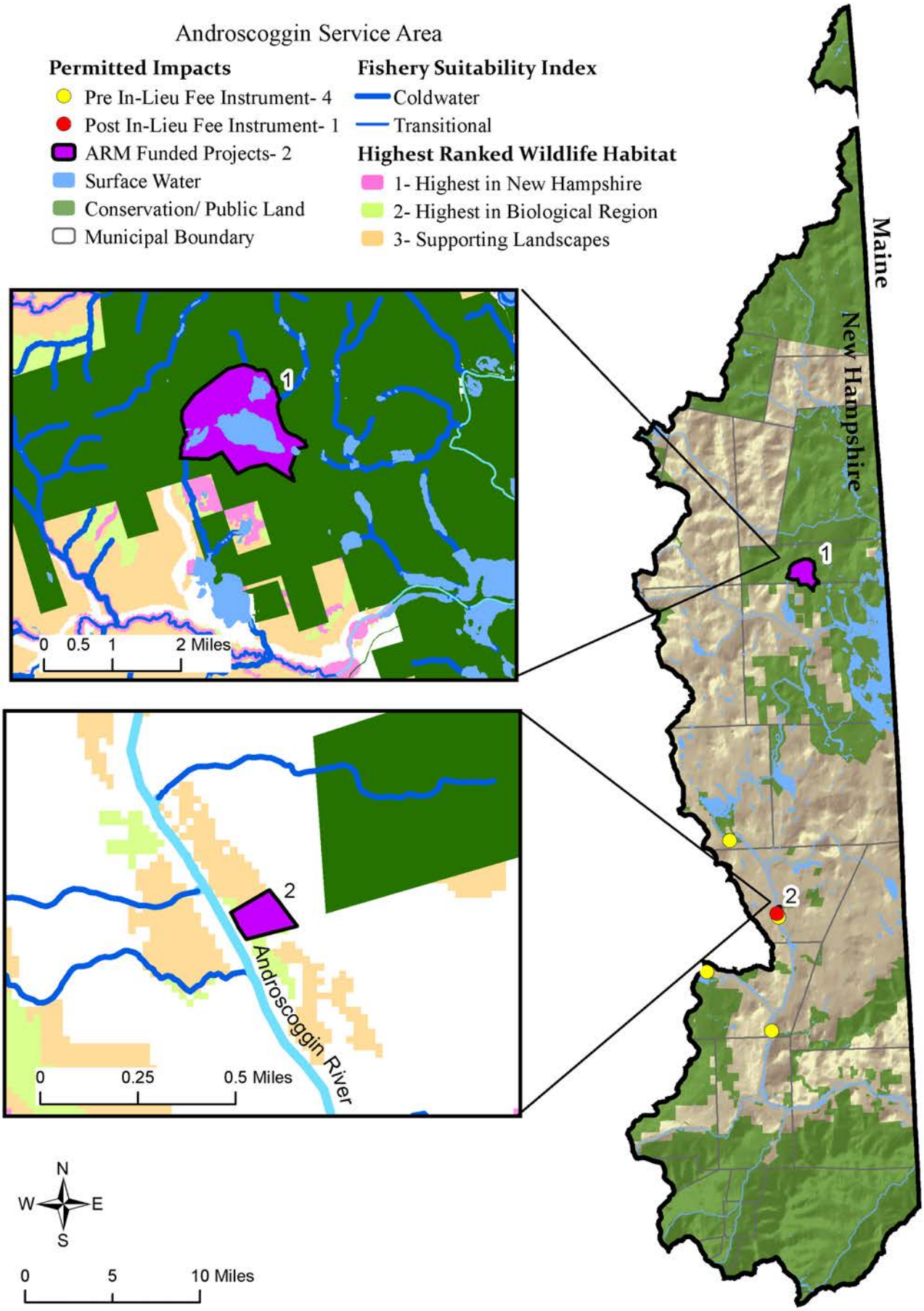
Androscoggin Service Area

The goal for this region was to target Tier 1 WAP areas along the river and north of the White Mountains National Forest, in the area of the Mahoosuc Range. The two projects funded in this service area established connections between existing protected lands and preservation of areas of importance (Map 2). The expansive Greenough Ponds project combined multiple funding sources, over many phases, to protect two ponds that sustain wild non-stocked brook trout populations — meeting program objectives by enhancing connectivity of protected lands and protecting cold-water fisheries habitat. The Milan Community Forest project contributed to conservation efforts along the Androscoggin River by protecting a parcel that contains wetlands, river frontage and important 100-year floodplain areas.

Future considerations for the region include restoration of lower habitat quality wetlands and streams that are adjacent to high-quality wetlands, and to provide long-term preservation of restored areas. In addition, removal of aquatic barriers (culverts and dams) in waterways identified as having high-quality instream habitat and the potential to sustain cold water fisheries, should be a focus of future restoration projects.

Greenough Ponds, Errol and Wentworth's Location, NH – credit: Jerry and Marcy Monkman/Ecophotography
Courtesy of the Trust for Public Lands

Map 2 – Map of Androscoggin Service Area permits and awards



Saco Service Area

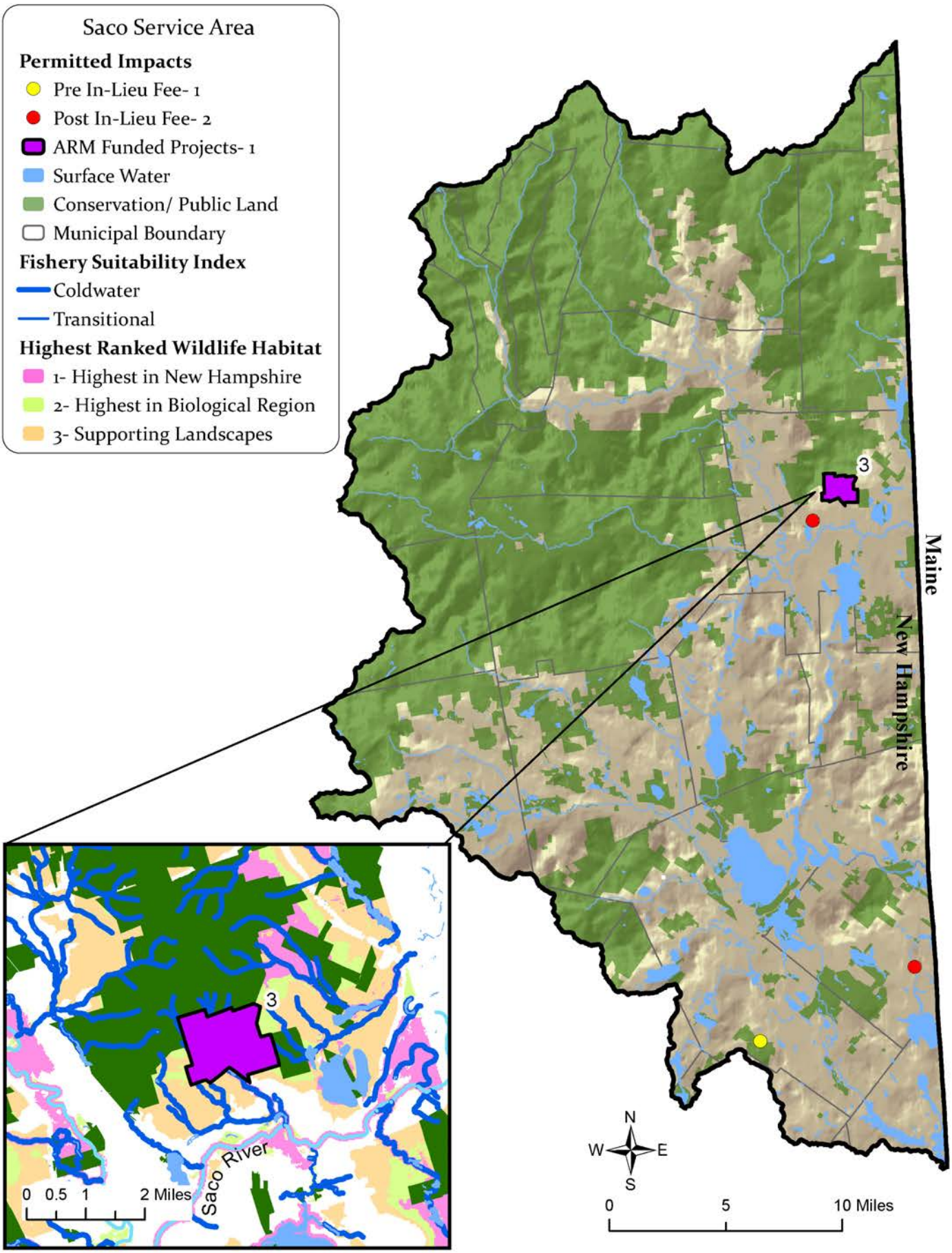
Conservation of WAP Tier 1 and 2 habitats, connecting existing protected lands and the preservation of habitat areas of importance were the focus in this service area. A review of development patterns was emphasized in order to consider protection of areas with forest cover, productive farm soils and drinking water resources. In addition, the protection of high quality streams and headwater stream areas were emphasized to be included in a strategic approach for protection and management in the surrounding areas (Map 3).

The one project that received funds was the Green Hills project in Conway. The conservation of 1,014 acres of land included 56 acres of wetlands with a prominent beaver flowage, black gum swamps, a rare natural plant community and 6.5 miles of tributary streams that encompass nearly the entire Mason Brook watershed. The project met the goals of the service area by providing a connection between protected lands and aquatic resources, as it abuts the 3,500-acre Green Hills Preserve – creating a 6,500-acre block of protected land. An additional component of this project is its proximity to an important aquifer recharge area that will benefit many downstream private and commercial wells.

Future grant opportunities should review restoration or enhancement opportunities near high-quality wetland habitats to improve aquatic resource functions and values. Projects should review opportunities for restoration of lower habitat quality wetlands and streams that are adjacent to high-quality wetlands. In addition, a focus on preventing the establishment of new invasive and exotic species populations to maintain healthy populations of native flora and fauna should be considered.

Green Hills Preserve, Conway, NH

Map 3 – Map of Saco Service Area permits and awards



Pemigewasset-Winnipesaukee Service Area

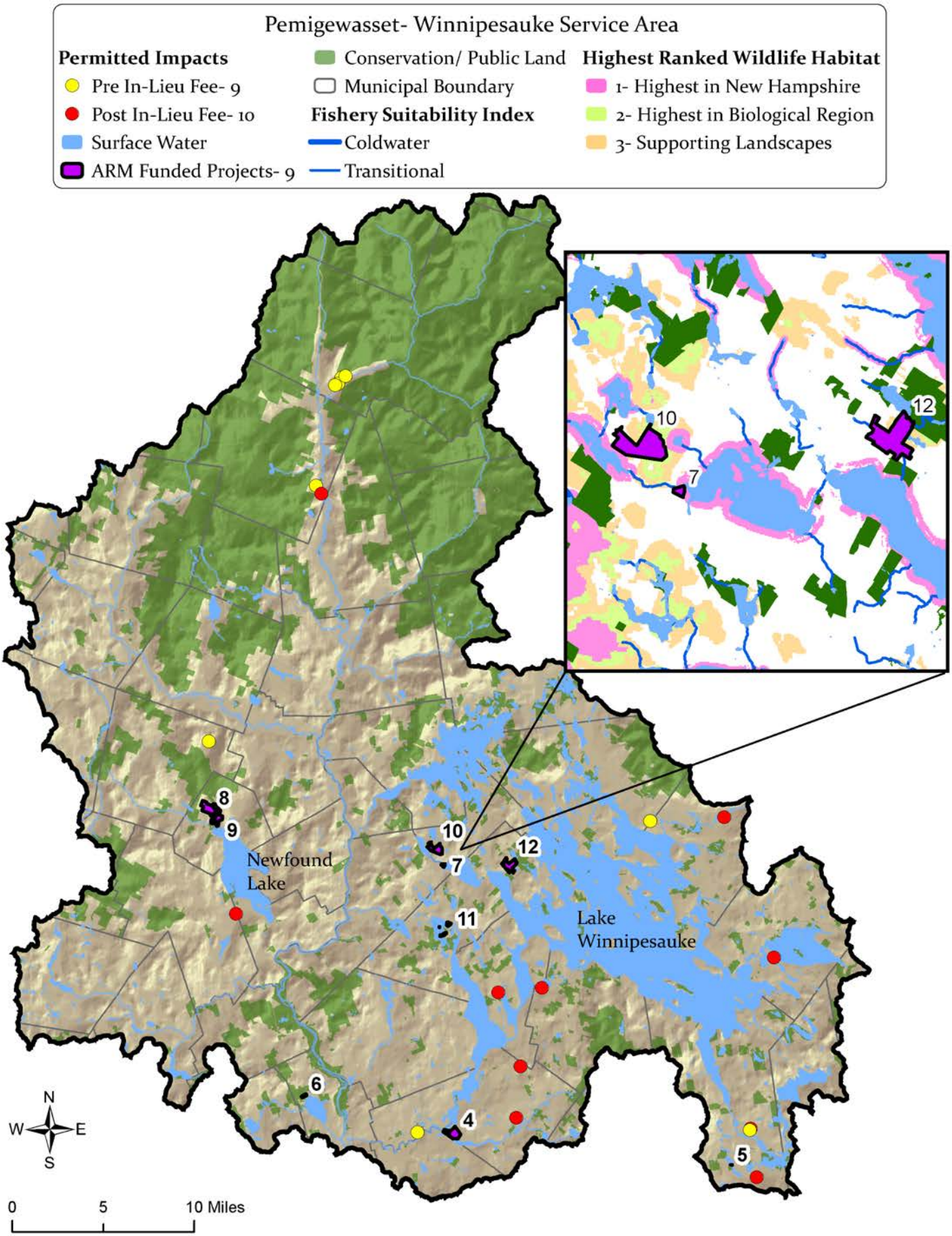
The overall goals for this service area include restoration of lower-quality wetlands and streams, provide long-term preservation of the restored areas, and protection of land in areas of projected development expansion. Land conservation focused on WAP Tier 1 and 2 habitats, connecting existing protected lands, and protecting ecologically important floodplain forests and stream buffers was also an emphasis. Finally, work to prevent the establishment of new invasive and exotic species populations in order to maintain healthy populations of native flora and fauna was highlighted.

Nine projects have been funded in the service area throughout the Pre- and Post-Instrument periods (Map 4). Seven awards focused efforts on completion of land conservation in the watershed, for a total of 900 acres placed under protection. These land conservation projects were focused in the area of the Newfound Lake, Webster Lake, Page Pond and Lake Wicwas, which are prime locations for development of lakefront homes. One unique project involved floodplain enhancement work to address habitat issues, roadway flooding, and the goal of improving hydrologic connectivity.

There were two invasive species management projects undertaken in this service area, with the Tioga River project in Belmont focusing efforts to eradicate the invasive Glossy Buckthorn, which was growing adjacent to town-designated prime wetland. Removal of the invasive involved several control methods and proved to be partially successful through the monitoring period funded by the grant. However, long-term control measures could not be ensured to routinely remove new growth and in some areas the invasive re-established. The results of this project provided good insight to the Site Selection Committee on what types of invasive species removal projects might be successful. Review of future projects now attempt to consider the likelihood of success from the proposed controls and the capacity of the grantee for long-term maintenance issues.

Coffin Brook restoration culverts, Alton, NH

Map 4 – Map of Pemigewasset-Winnipesaukee Service Area permits and awards



Salmon Falls-Piscataqua Service Area

This coastal service area is unique in its size, natural resources, and concentration of active conservation organizations and partnerships that are working to protect clean water, restore coastal habitats, and enable communities to become more resilient to flooding. The NHDES Coastal Program supports the region's economy by helping to preserve the environmental health of the coast, Great Bay and Hampton-Seabrook estuaries for fishing and shellfishing, and assisting with the maintenance of the harbors and tidal rivers for commercial and recreational uses. Specific goals in this region include conserving or restoring wetlands that maximize nitrogen pollution removal; implementing best management practices that reduce nitrogen loading to the Great Bay; and working to protect Conservation Focus Areas identified in The Land Conservation Plan for New Hampshire's Coastal Watersheds[6]. Wetland protection/restoration projects that will support wetland-dependent rare species habitat (e.g., saltmarsh sparrows, Blanding's turtle, spotted turtles, wood turtles, ringed boghaunter, etc.) should also be pursued. The program plans to continue supporting conservation projects that protect WAP Tier 1 and 2 habitats, with an emphasis on protecting parcels that facilitate landscape connectivity by linking other preserved lands. In addition, enhancing aquatic connectivity in this watershed remains a goal, and future projects that remove barriers (culverts and dams) for diadromous fish and rare resident fish populations (e.g., American brook lamprey, brook trout) to access high-quality stream habitat will be encouraged. One final goal for this area is to encourage salt marsh restoration, and identify and protect coastal areas that may allow for salt marsh migration, or other ways to adapt to climate change.

Great Dam removal and Exeter River restoration, Exeter, NH

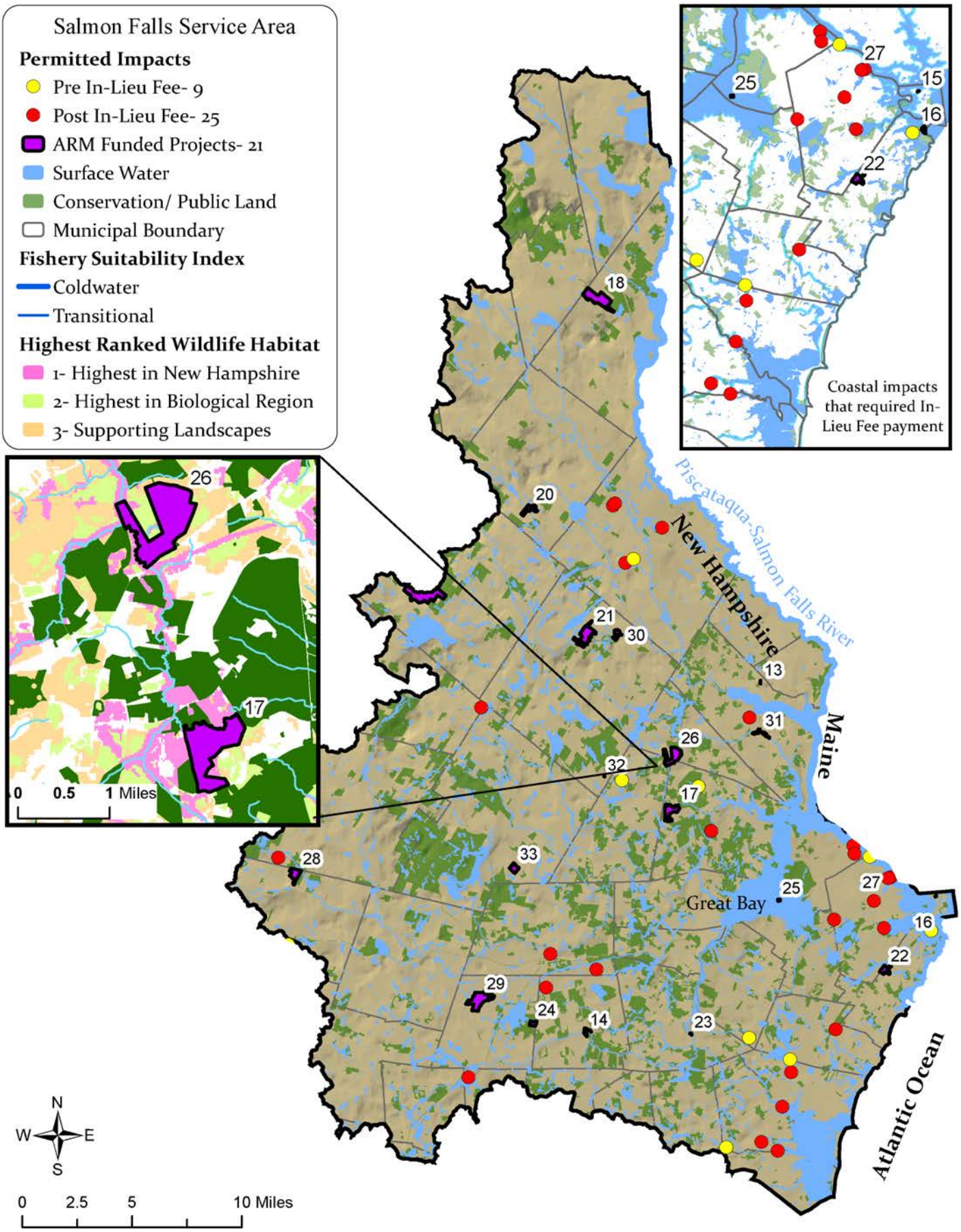
The ARM Fund has provided awards to 20 projects (Map 5) in this service area totaling 2,832.9 acres of land in conservation. The projects have ranged from restoration of wetlands, streams, living shoreline habitat, oyster reef re-establishment and significant land conservation, with a focus on rare species and environments. The work has extended to invasive species management at a State Park, as well as two significant dam removal projects. The major rivers and systems in this region include the Exeter River, Berry Brook, Cocheco River, Oyster River, Isinglass River and Great Bay, and all have received assistance from ARM. Successful land protection efforts have targeted WAP Tier 1 and 2 areas, Blanding's turtle conservation areas and parcels that provide connections to other conservation lands. In particular, the Evans Mountain project permanently protected 1,015 acres of land, which is a part of a 6,000-acre unfragmented forest that includes headwater streams to Bow Lake and the Isinglass River. Preservation of this land provides a large habitat block accessible to far-ranging mammals such as bear, moose, bobcat and other species important for conservation in New Hampshire.

One of the first major ARM Fund restoration projects took place within Berry Brook in Dover and included work to restore and recreate 1,960 feet of stream channel, remove fish passage barriers and provide significant treatment of 164 acres of watershed for diadromous fish and other aquatic species. Berry Brook was improved and continues to be monitored through research partners at the University of New Hampshire. The opportunity in this location for water quality improvements and the partnership of City and State resources made this project a tremendous success for the Program.

In the future, a focus on undeveloped lands adjacent to estuaries that support coastal habitat resilience to climate change and sea level rise, and large buffers along streams and river, should be added to the issues that deserve priority in this watershed. As noted in the introduction, this area is at great risk of water quality degradation from development. Projects that provide preservation in areas of projected development expansion should also be encouraged.

[6]https://www.epa.gov/sites/production/files/2015-09/documents/piscataqua_land_conservation_plan.pdf

Map 5 – Map of Salmon Falls-Piscataqua Service Area permits and awards



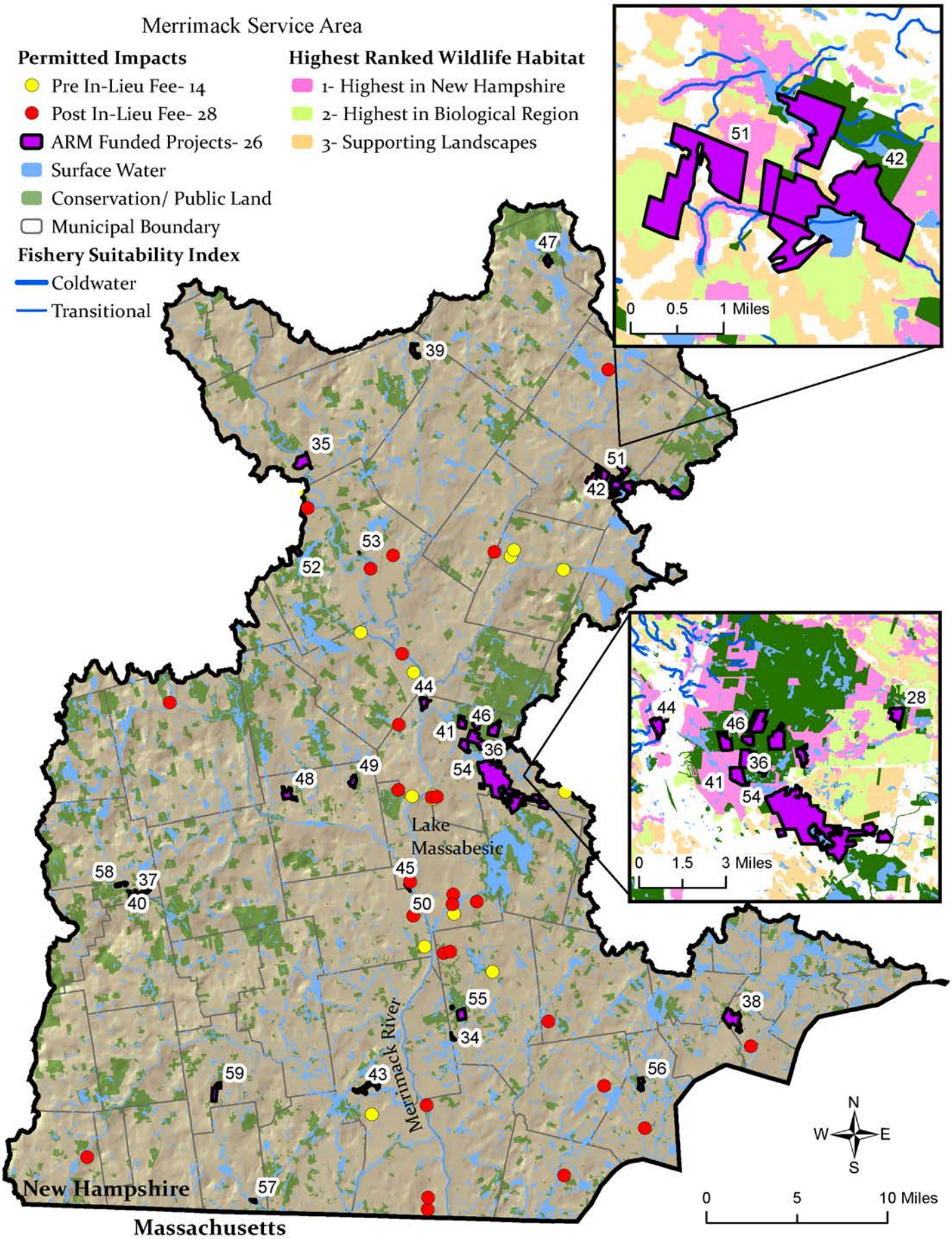
Merrimack Service Area

The goals for this service area include restoration of lower habitat-quality wetlands and streams that are adjacent to high-quality wetlands, and to provide long-term preservation of the restored areas. The focus is to encourage preservation projects, particularly in areas of projected development expansion and within WAP Tier 1 and 2 habitats, and to connect existing protected lands and preserve areas of importance (Map 6). In addition, there is a focus to protect upland buffers associated with valuable vernal pools. These sensitive areas are at risk throughout this region due to extensive road crossings and fragmentation of habitat. Finally, the goal to remove barriers (culverts and dams) in high-quality streams has been emphasized. The goals for this region have largely been met by the 26 projects that received ARM Funds over the past decade – with 22 of the projects focused on land protection. Several key projects that have been awarded funds have had great significance for land protection in the towns of Barnstead/Strafford/Pittsfield (1,100 acres), Canterbury (413 acres), Plaistow (350 acres), Goffstown (278 acres) and Francestown (246 acres). Land preservation in the town of Hooksett permanently protected 2,468 acres of WAP Tier 1 habitat that interconnects with 24,000 acres of contiguous conserved lands. The Hinman Pond property provides critical habitat for several rare or endangered species, and the property lies within the Lake Massabesic watershed, Manchester's public drinking water supply.

The restoration projects funded over the years have been very successful in restoring stream habitat and aquatic organism passage in this region. The McQuesten Brook area in Manchester and Bedford has been a focus of a two-phased project resulting in the removal of two deficient culverts, channel restoration work and dam removal that improved 1,500 linear feet of trout habitat. Restoring full aquatic organism passage at two road crossings increased access to 1,950 feet of McQuesten Brook for the Eastern brook trout naturally occurring in this area. These projects, although funded in two separate towns and in different years, were reviewed together in an effort to establish monitoring parameters unique to the projects' overall success. It was determined that performance standards range quite significantly for stream restoration projects and it is recommended that long-term monitoring should be focused on the site characteristics and goals set for the work to determine success.

Avery Brook Woods Road culvert replacement project before and after – Francestown, NH

Map 6 – Map of Merrimack Service Area permits and awards



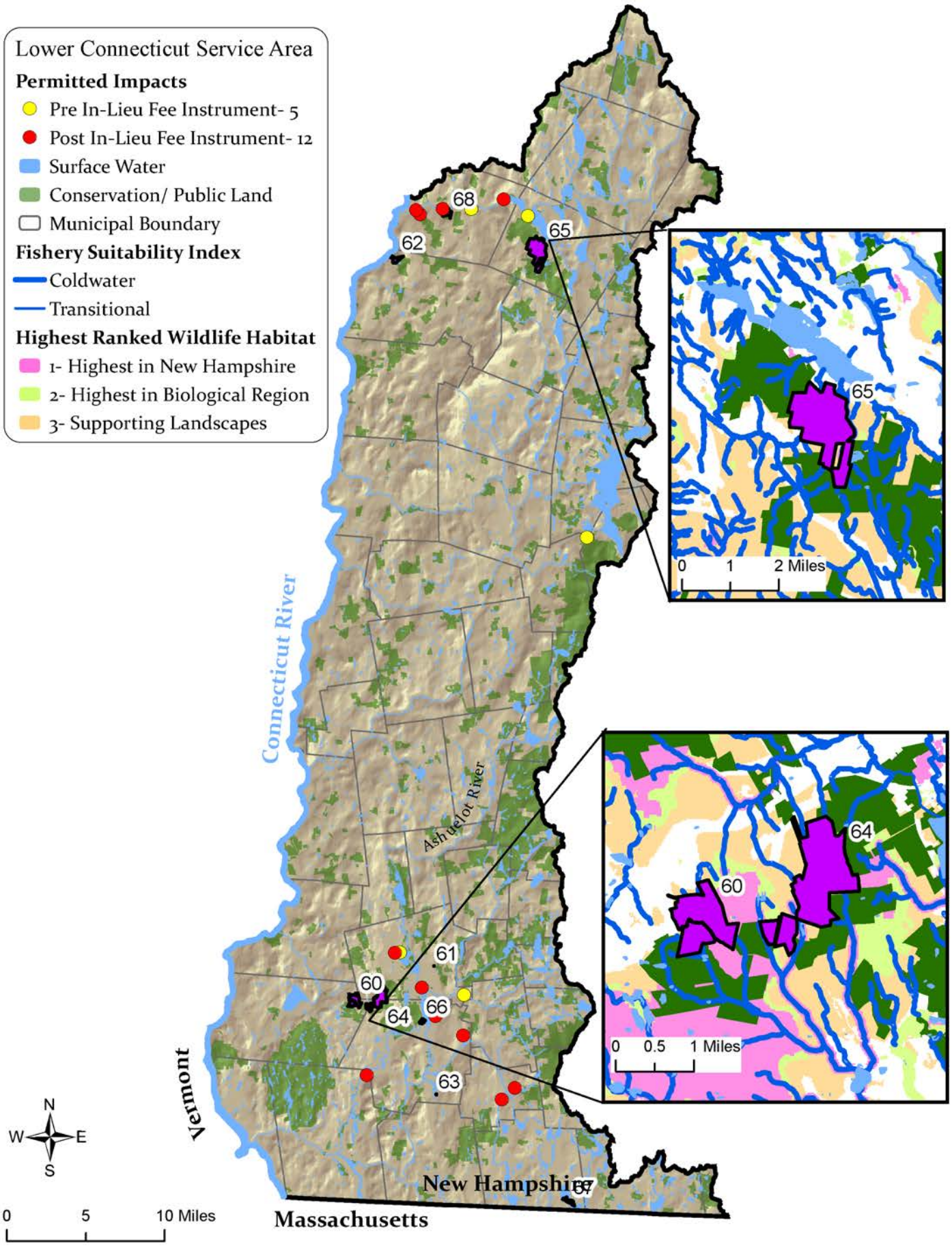
Lower Connecticut Service Area

The goals set for the Lower Connecticut service area are to encourage restoration of lower habitat-quality wetlands and streams that are adjacent to high-quality wetlands and provide long-term preservation of the restored areas; and encourage preservation projects, particularly in areas of projected development expansion and in WAP Tier 1and 2 habitats to connect existing protected parcels and preserve areas of wildlife importance. Another focus of this service area is to protect ecologically important floodplain forests in the Connecticut River Watershed with emphasis on protection of major floodplain forest types across river size, gradient and ecological sub-sections north to south, and development of management plans for these areas (Map 7).

A total of nine projects have been funded by ARM in this service area, with most of the grants (eight) awarded in the Post-Instrument period. Restoration projects involved wetland fill removal from within the Beaver Brook watershed, a culvert replacement project improving aquatic organism passage within Falls Brook, and floodplain forest restoration along 1,500 feet of the State-designated Ashuelot River, which restored 11 acres of floodplain forest habitat that was previously hayfield. The floodplain restoration project was located in the Lower Basin Aquifer within the towns of Keene and Swanzey, and focused in an area that is highly favorable for groundwater supply because of excellent water quality and yield. Land conservation projects included protecting a total of 2,159 acres – contributing to large unfragmented blocks of land and landscape connectivity; preserving wellhead protection areas; and protecting aquatic resources identified as high-quality fish habitat. The ARM Fund SSC evaluates projects based upon criteria that are aligned with the preservation and restoration goals of the service area and will continue to support projects that focus on these service area priorities.

Sip Pond, Fitzwilliam, NH

Map 7 – Map of Lower Connecticut Service Area permits and awards



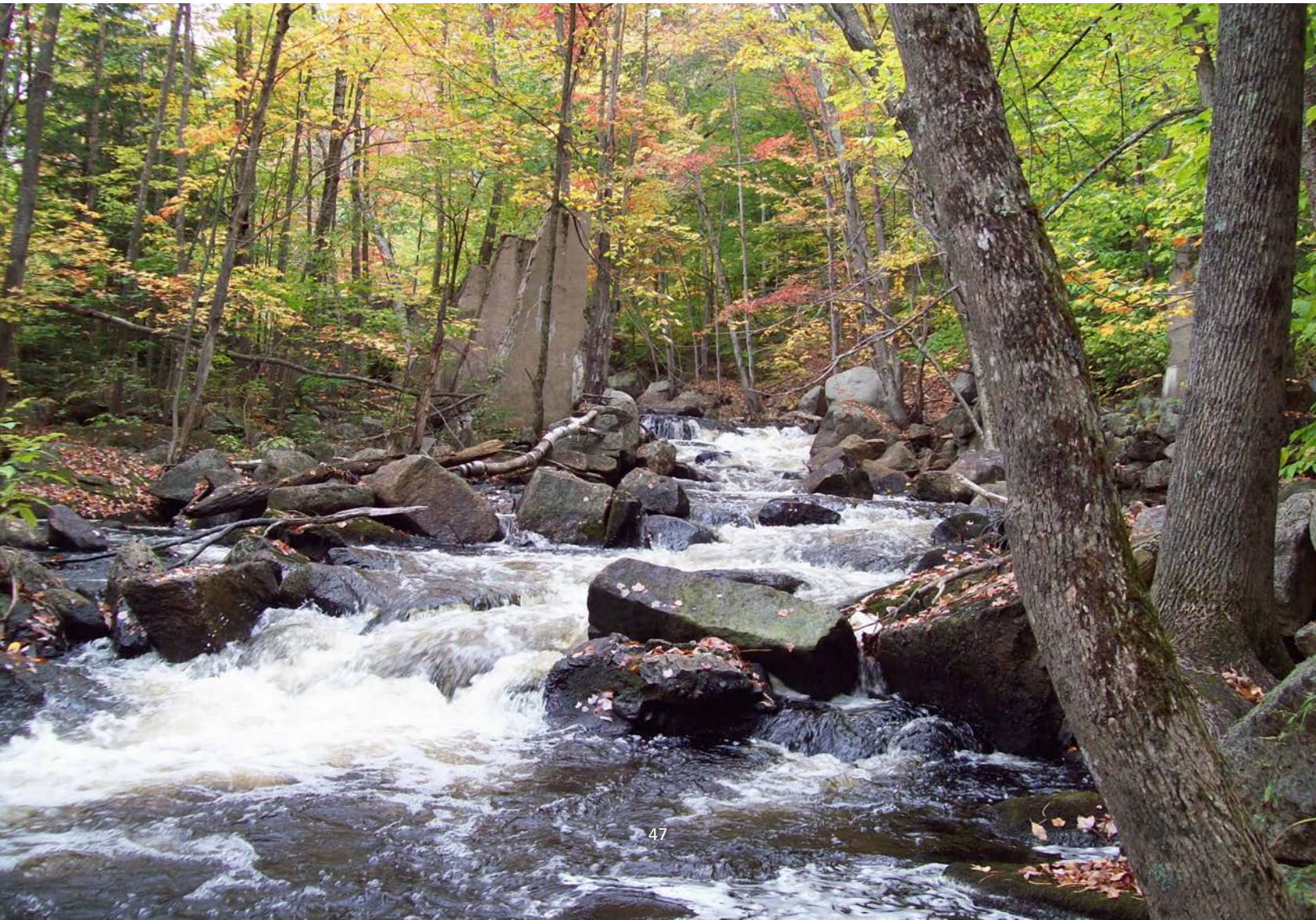
Contoocook Service Area

The ARM Fund provided funding for three projects in this service area, all during the Post-Instrument period, totaling 574 acres of land in conservation (Map 8). The overall goals for this service area include restoration of lower-quality wetlands and streams, providing long-term preservation of the restored areas, and protection of land in areas of projected development expansion. Establishing landscape connectivity in high-quality wildlife and aquatic resources is a key focus, with emphasis on conservation of WAP Tier 1 and 2 habitats and connecting previously-protected lands. The goal of removing barriers (culverts and dams) in high-quality streams and an attempt to consider strategic approaches to protect and manage uses in surrounding areas was emphasized.

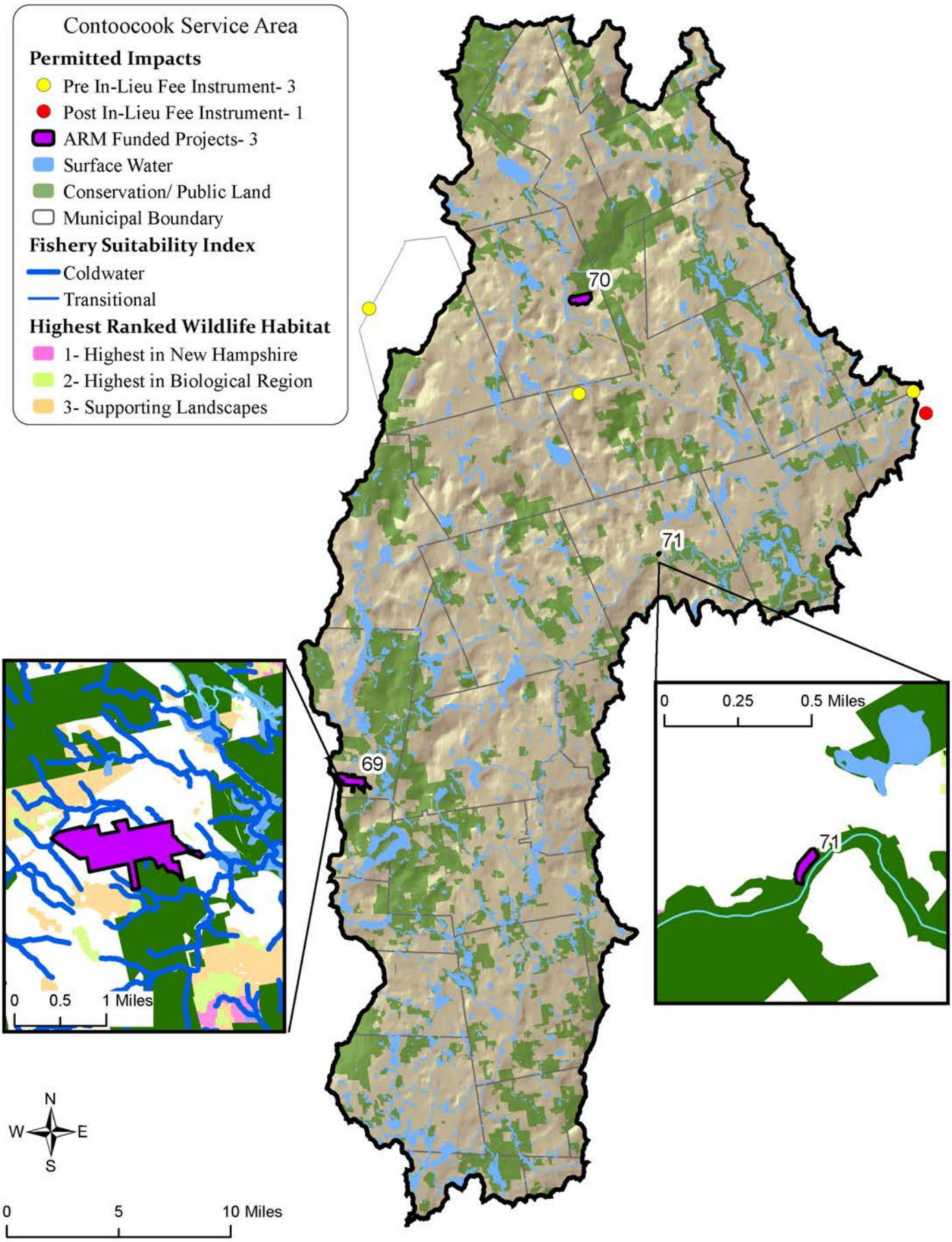
One exemplary project in the service area was the conservation of the 236-acre Brown property in Sutton that added to a large forested block of land, amounting to a total of 9,000 acres of contiguous protected lands. This project represents a longstanding commitment of the NHFG Fisheries Division to conserve coldwater streams and restore wild brook trout populations in the watershed. Through that effort, NHFG identified the stream on the Brown property as having the highest documented wild brook trout density in the Lower Warner River watershed. The property also contains high-quality wildlife habitat, including 63 acres of WAP Tier 1, 46 acres of WAP Tier 2, and at least three State-listed rare plants. Public access to this property and adjacent Kearsarge Regional High School provide exceptional educational opportunities.

In the future, a review of restoration or enhancement opportunities near high-quality wetland habitats to improve aquatic resource functions and values should be considered. This, along with efforts aimed at preventing the establishment of new invasive and exotic species populations, will maintain healthy populations of native flora and fauna.

Loveren Mill on the North Branch River, Antrim, NH – credit: Mike Little



Map 8 – Map of Contoocook Service Area permits and awards



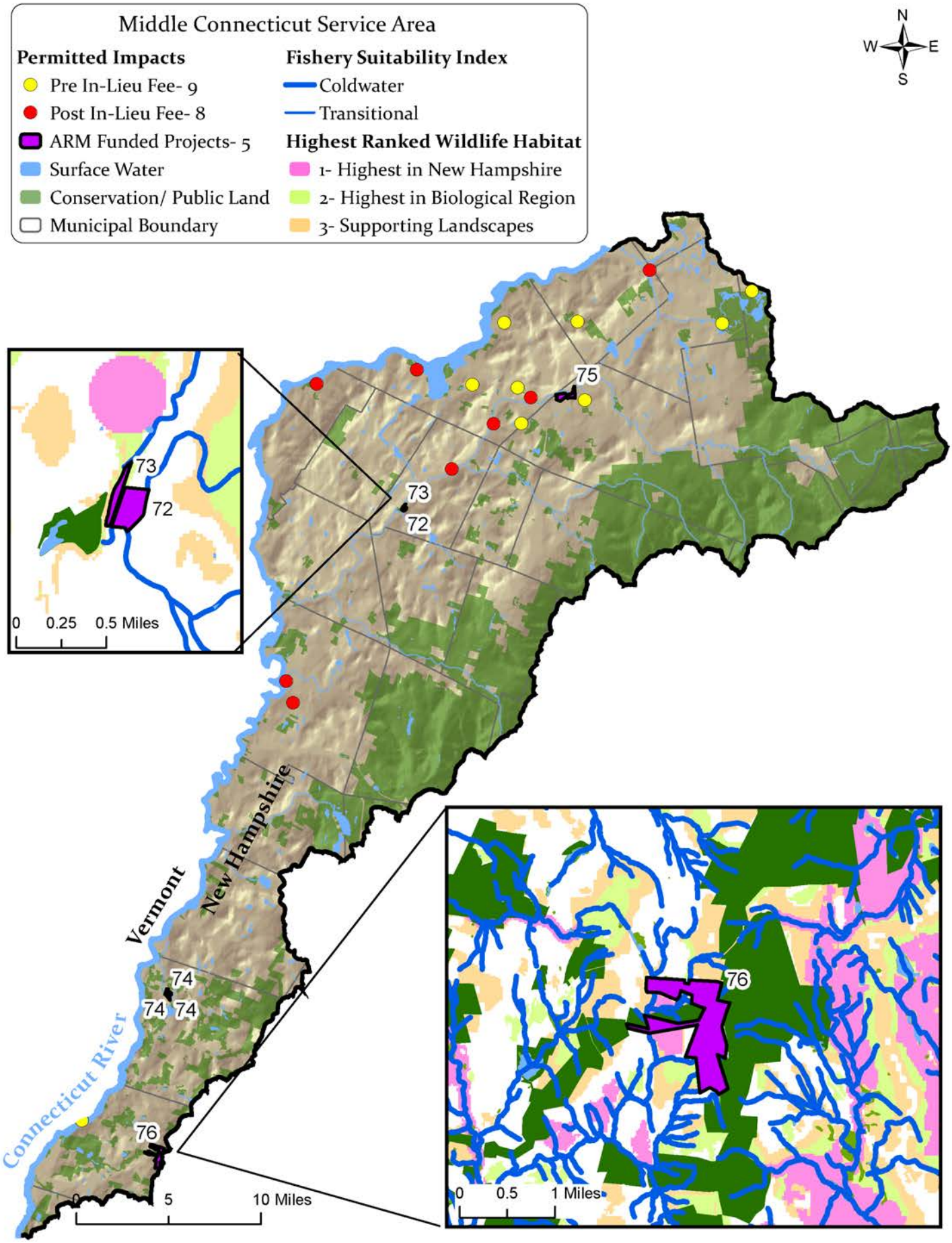
Middle Connecticut Service Area

Land preservation projects in this service area focused on conservation in WAP Tier 1 and WAP Tier 2 habitats, and established connections between existing protected lands. The floodplain forests in the Connecticut River Watershed are both ecologically important and serve an invaluable water quality function; projects that not only protect these areas but also develop management plans and include restoration or enhancement components will be emphasized. Future conservation of forested streams and important buffer areas surrounding headwater streams will require a strategic approach to management of the surrounding areas. Lastly, preventing the establishment of new invasive and exotic species in the watershed to support native populations of flora and fauna was noted.

The five funded projects occurred in the Post-Instrument period, and addressed program goals well through preservation and restoration efforts located on the Ammonoosuc River and along major roadways that could be developed, and the conservation of sensitive, high-elevation wildlife habitat with rare wetland types on the property (Map 9). Funding amounts vary from project to project, and most projects require multiple funding sources to be completed– a noteworthy aspect of ARM support in this region is that ARM often contributed a high percentage of the total project cost, resulting in significant credit achieved for the program through funds disbursed (Appendix B).

Jordan Brook, Franconia, NH
credit: Mary Ann Tilton

Map 9 – Map of Middle Connecticut Service Area permits and awards



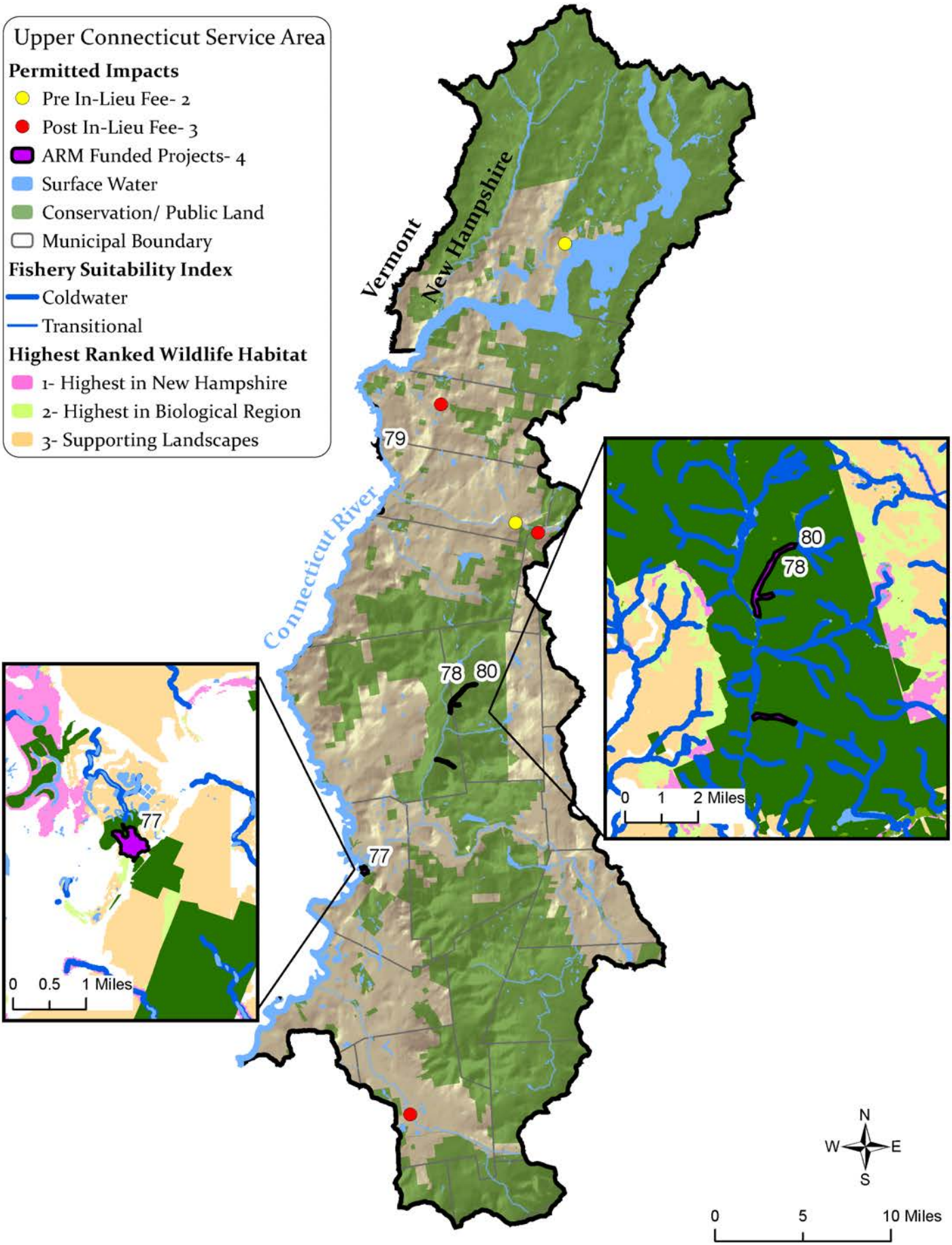
Upper Connecticut Service Area

The goals set for the Upper Connecticut service area include review of lower-quality wetlands and streams adjacent to high-quality wetlands for potential restoration opportunities, and the provision of long-term preservation of the restored areas. Land conservation of WAP Tier 1 and 2 habitats, and establishing connections between previously-protected lands, is of importance in this region. Ecologically important floodplain forests in the area are highlighted with major floodplain forest types across river size, gradient and ecological sub-sections north to south, and should be restored and protected. It was noted that, based on the wetland quality standards, significant areas of poor quality are in the area near Lancaster, north to Northumberland. The properties bordering the river are likely agricultural areas that would not need to abandon farming practices – improvements to the wildlife habitat function could be achieved through riparian buffer plantings or floodplain restoration.

The four projects in this service area (Map 10) address these goals through land protection, including 398 acres along the Connecticut River and the restoration of a floodplain forest occurring in a rare natural community. This project achieves the goal of creating a more resilient ecosystem by allowing for channel migration that assists in creating oxbows and sandbars important to the health of the river corridor. In addition, two separate efforts completed in-channel improvements in the Nash Stream watershed, restoring habitat in the main stem and tributaries through wood replenishment and reconnecting tributaries in the publicly-owned forest.

Upper Connecticut Floodplain Project
Colebrook, NH

Map 10 – Map of Upper Connecticut Service Area permits and awards



Summary of Program Improvements

Revisions to Administrative Rules

The existing rules in Env-Wt 800 – Compensatory Mitigation establish the procedures and substantive requirements that apply when compensatory mitigation is required for unavoidable wetlands impacts. Specifically, the rules establish acceptable forms of mitigation, the amount of mitigation required, the information needed for a mitigation proposal to be deemed complete, the criteria used to evaluate mitigation proposals, the requirements for accepting an ILF payment, use of the ARM Fund, requirements for ARM Fund applicants, and ARM Fund project evaluation criteria. The rules were due to expire on June 19, 2015, so the chapter was proposed to be readopted. As part of the readoption, amendments were proposed to (1) clarify existing requirements, (2) improve the process for submitting and evaluating wetland mitigation proposals, and (3) align the rules with revisions to RSA 482-A:29 and federal requirements. The proposed changes were adopted on February 1, 2016.

The revised rules clarify the permitting process when compensatory mitigation is required and better explain how the ARM Fund operates. The 2016 rule changes benefit the environment and the public by being clearer and by explicitly including provisions related to stream impacts and stream mitigation projects. One clarification in the rules requires applicants to review a municipal list of projects in an effort to encourage communities to identify deficient stream crossings and develop mitigation opportunities to improve stream passage in areas of high flood potential or restricted flow. This will provide an increase in high-quality restoration and conservation projects that enhance conditions for fish and wildlife, and result in beneficial improvements in the environment for the regulated public.

The amendments also improved the administrative process for mitigation proposal review and clarify the rules to reflect what is already required under federal law. Improvements in the disbursal of payments collected by the ARM Fund will benefit the regulated community and the natural environment by resulting in high-quality aquatic resources being restored and protected. The need for applicants to consult with ACE about mitigation for projects that also require a federal permit is now stated explicitly so an applicant is required to have a pre-application meeting if compensatory mitigation will be required for a proposed project. The meeting provides early coordination on the project and assists in the development of the potential compensatory mitigation proposals early in the process. The list of rule revisions and additions include the following:

- Applicants have to review a list of local mitigation projects from the municipality if one has been prepared (801.03(a)).
- An additional methodology is identified for use in evaluating wetland functions within a development site and for the proposed mitigation site.
- Requirements specific to stream impacts and stream mitigation projects were added.
- Limitations on proposing wetlands or vernal pool creation were established.
- A new section has been added to establish requirements for stream restoration or enhancement projects, including goals, types of projects, and information and plans required to be submitted.
- An option was added for a permittee who proposed permittee-responsible mitigation to request the substitution of an ILF payment if it becomes apparent that the mitigation project will not be successful.
- Provisions were added to adjust a mitigation monitoring plan.
- Provisions were made to account for stream payments to be separate from wetland payments.
- Any person wishing to obtain ARM Funds would have to submit a pre-proposal so an eligibility determination could be made early on (before a great deal of time and effort has been put into a proposal).
- Criteria for evaluating applications for stream passage improvement projects were established.

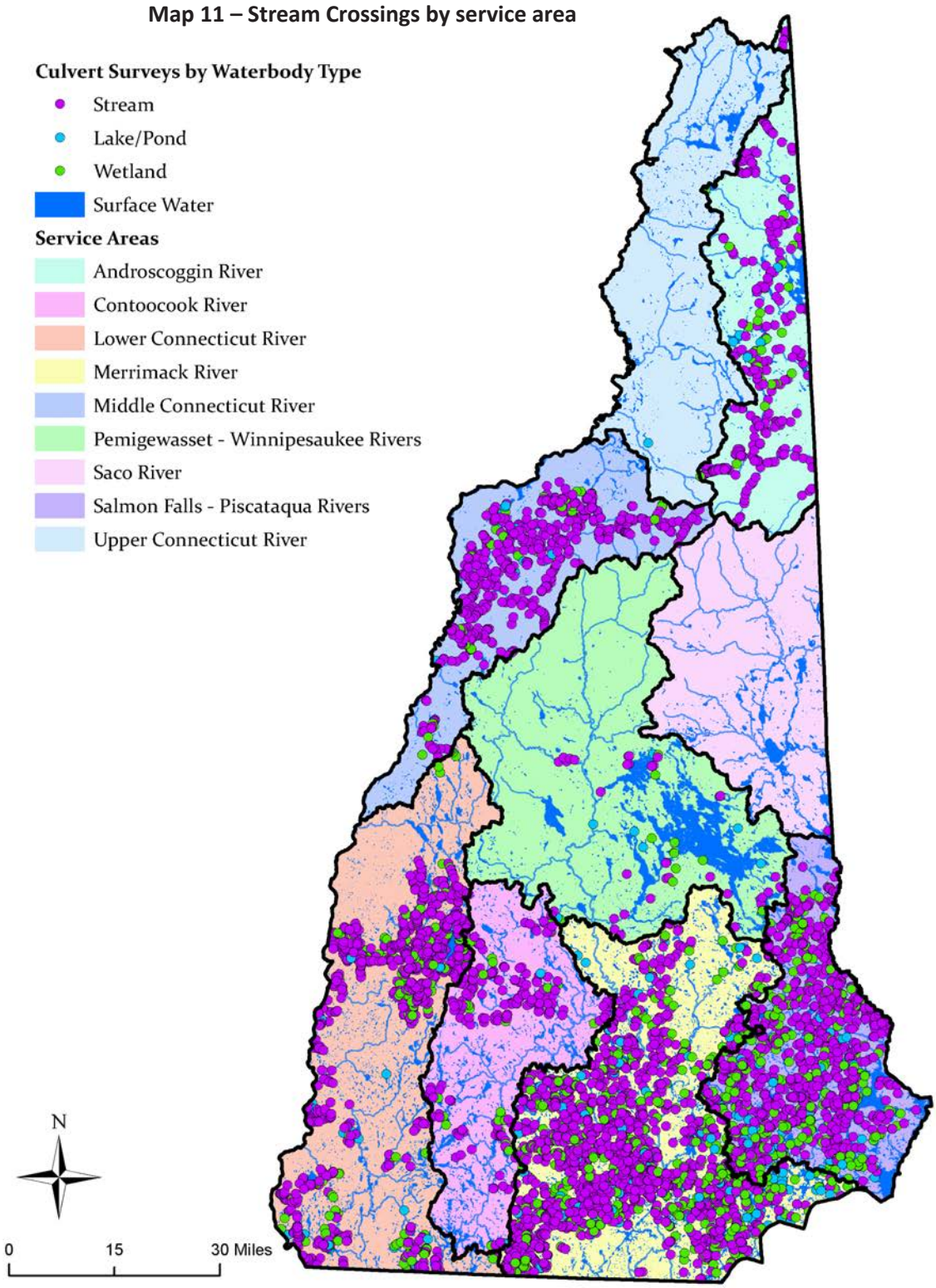
Finally, multiple meetings of the SSC and Interagency Review Team took place to propose changes and improvements to the ARM Fund evaluation criteria in Env-Wt 808.19. Question 1A and B will be considered in subsequent rulemaking efforts with the draft criteria to be used in the 2018 grant round (Appendix A).

Stream Crossing Initiative and Restoration Prioritization Mapper

With an estimated 17,500 stream crossings in New Hampshire, several state programs are collaborating to address the impacts of inadequate stream crossings on aquatic habitat, stream connectivity and public safety. The New Hampshire Stream Crossing Initiative is a multi-agency program led by the NHDES Geological Survey and Wetlands Bureau with the mission to inventory stream crossings throughout the state to inform data-driven decisions on culvert replacements and stream restoration. The goal of this multi-agency partnership is to provide the data and support that will enable stakeholders to target stream crossing replacements that will reestablish aquatic connectivity, enhance fish habitat and increase flood resiliency in New Hampshire's waterways.

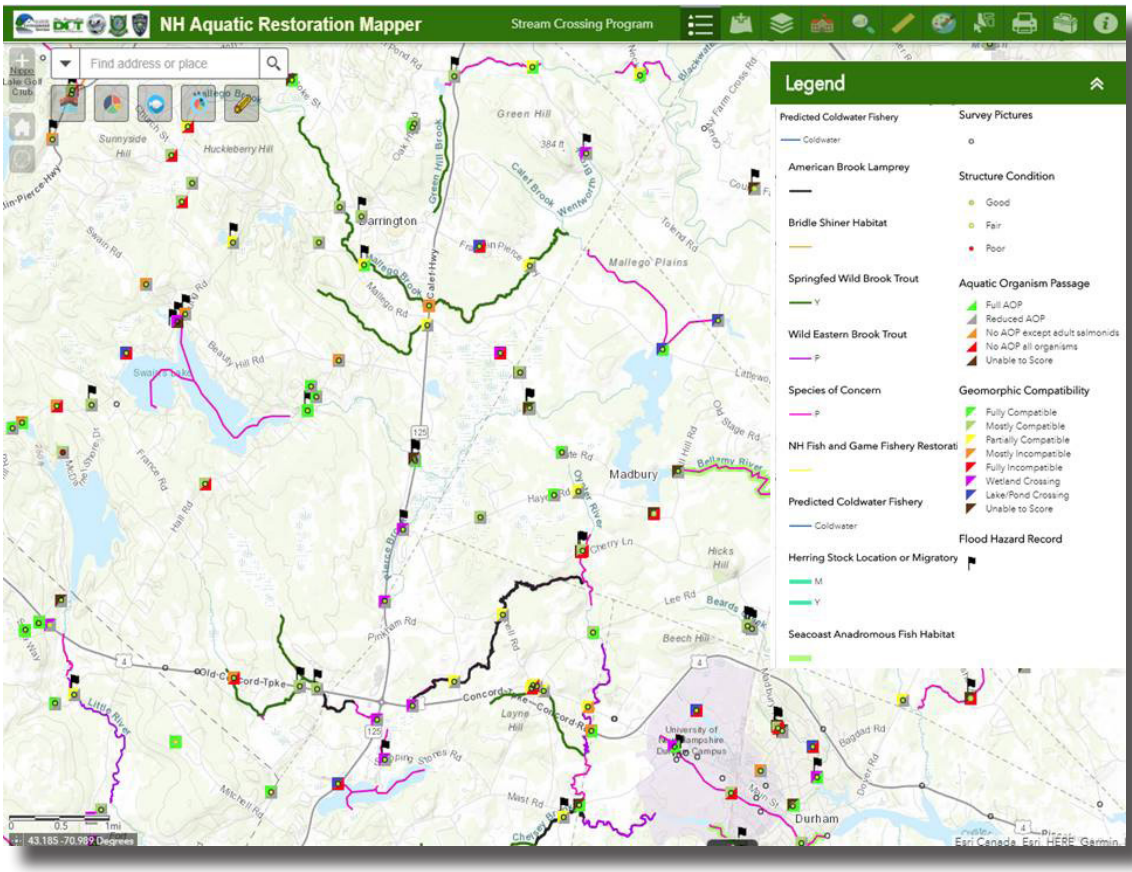
The New Hampshire Departments of Environmental Services, Transportation, Fish and Game, and Homeland Security and Emergency Management, along with several Regional Planning Commissions and non-profit groups, have teamed up to address the complex problem of undersized and deficient crossings by conducting field surveys at stream crossings throughout the state. Since 2008, these combined efforts have provided data on fish passage, geomorphic compatibility and flood vulnerability at approximately 5,500 crossings across the state (Map 11). Significant efforts have been focused in the most rapidly developing service areas in the southeast region of the state and in watersheds that provide potentially suitable

Map 11 – Stream Crossings by service area



cold water fishery habitat in higher elevations and northern regions. To date, there have been 2,023 surveys in the Merrimack, and 1,188 surveys completed in the Salmon Falls, services areas. To understand aquatic barriers that potentially inhibit fish access to cold water stream habitat, efforts have been made to survey crossings in the Middle Connecticut (621), Lower Connecticut (964), and Androscoggin (289) service areas.

To help prioritize those culverts that should be upgraded to maximize aquatic habitat connectivity, the local fish community and ecological setting need to be taken into consideration. In 2017, NHDES worked with NHFG to develop The Aquatic Wildlife Action Plan-Fishery Priority Layer – a spatial dataset to highlight important aquatic habitat identified by the Inland Fisheries Division of NHFG. The layer integrates data from 4,000 field surveys, predictive habitat suitability models and expert knowledge on the fish community, to the stream reach level statewide. Streams are categorized by the presence of species of concern identified in the 2015 State Wildlife Action Plan, migration corridors important to diadromous fish and areas where NHDES has invested resources into restoration or other ongoing conservation work. The intent of the layer is to increase awareness of the Inland Fisheries Division's conservation goals, as well as to encourage stream restoration and culvert replacement in areas that will connect important aquatic habitats, while improving infrastructure and increasing flood resiliency.



Based on feedback from communities and other stakeholders, it was determined that culvert replacement decisions vary from town to town, region to region, and depend on the funding source targeted to replace the structure. The State Steering Team decided to explore the use of web-based mapping tools as a public interface for the stream crossing and fish habitat data. The members agreed that a flexible tool that allows users to query and display the stream crossing data based on their own priorities would support municipalities and other stakeholders involved in stream crossing replacements. In 2017, the NHDES Wetlands Bureau and Geological Survey partnered to develop the *New Hampshire Aquatic Restoration Mapper*, an interactive viewer to explore stream crossing and aquatic habitat data to identify and prioritize stream crossings for replacement to meet restoration, aquatic connectivity, and flood resiliency goals. The *New Hampshire Aquatic Restoration Mapper* is a decision support tool to target restoration efforts and identify mitigation opportunities to improve stream connectivity, restore important fish habitats and increase flood resiliency. This mapping tool was created in tandem with the updated ARM criteria to evaluate stream restoration projects (Appendix A), enabling the team to incorporate the critical pieces of information used to evaluate ARM projects directly in mapper, so users can identify projects that would be most eligible for mitigation funds. The mapper combines stream crossing scores for aquatic organism passage, flood vulnerability and geomorphic compatibility with stream and terrestrial habitat and conservation data overlays.

Appendix A

ARM Fund Draft Evaluation Criteria

Question 1 of the Evaluation Criteria was revised in tandem with the Aquatic Restoration Mapper. It will be considered in subsequent rulemaking with the draft criteria used in the 2018 grant round.

1.A. Wetland Restoration/Enhancement (Maximum 27 Points Possible)

Project restores, enhances or replaces wetland types (NWI) and/or wetland functions and values that were lost in the HUC 8 watershed. In general, funds shall go towards projects or a suite of projects that provide the greatest potential to restore, enhance or replace ecological integrity, water quality, and wildlife habitat functions and values lost by the impacts in the HUC 8 watershed as documented in the program ledger, and/or the Compensation Planning Framework for the watershed.

Ecological Integrity

a. _____ (up to 9 points)

In general, projects will result in an increase in ecological/hydrologic integrity through a specific activity. The difference in value is based on anticipated change in value or score based on a pre-treatment assessment of the site. If more than one wetland is being affected, then the score shall be the difference in the aggregate of all Ecological or Hydrologic Integrity scores for all wetlands being treated. Greatest amount of points go to a project that results in a significant increase. No points would be awarded if there is no appreciable difference in Ecological or Hydrologic Integrity that will result from the proposed project.

Water Quality

b. _____ (up to 9 points)

In general, projects will result in an increase in water quality functions through a specific activity. The difference in value is the anticipated change in value or score based on a pre-treatment assessment of the site. If more than one wetland is being affected, then the score shall be the difference in the aggregate of all Water Quality related functional scores for all wetlands being treated. Greatest amount of points go to a project that will result in an increase in water quality functions through one or more of the following activities: reducing/treating stormwater inputs, restoring hydrology, increasing recharge, stabilizing soils, installing filter strips, increasing flood storage, enhancing sediment trapping, or increasing nutrient uptake or transformation that results in a significant increase. No points would be awarded where there is no appreciable difference in water quality will result from the proposed project.

Wildlife Habitat

c. _____ (up to 9 points)

In general, projects will result in an increase in wildlife habitat functions through a specific activity. The difference in value is based on anticipated change in value or score based on a pre-treatment assessment of the site. If more than one wetland is being affected, then the score shall be the difference in the aggregate of all wildlife-related functional scores for all wetlands being treated. Greatest amount of points will result in an increase in wildlife habitat function(s) by one or more of the following activities: replanting native species, increasing production export, restoring buffer area integrity, restoring hydrology for AOP, improving habitat structure, re-introducing native species and their habitat, or eliminating or controlling invasive species that results in a significant increase. No points would be awarded if there is no appreciable difference in wildlife function(s) will result from the proposed project.

1.B. Stream Restoration/Enhancement (Maximum 27 Points Possible)

No more than 27 points shall be assigned based on the potential the project has to provide a stream passage or habitat improvement for stream resources lost within the service area, and those that have been identified by the site selection committee.

Aquatic Organism Passage and Geomorphic Compatibility

a. _____ (up to 6 points)

In general, upgrading road crossings and removing dams without land acquisition projects improve aquatic organism passage and geomorphic compatibility of the stream. The project needs to identify the deficiencies of the crossing(s) proposed to be replaced and provide the scores for Aquatic Organism Passage (AOP) and Geomorphic Compatibility according to the New Hampshire Stream Crossing Initiative scoring scheme. The deficient crossing documentation should provide information that notes its priority for replacement based on local or state planning if available. This question scores the stream restoration or improvement only; if land protection is offered, those points would be gained in Question 4. Tidal crossings will be assessed on a case-by-case basis. Greatest amount of points will go to a project that will replace (or remove) a structure that indicates no AOP for all aquatic organisms (including adult salmonids); OR is ranked as fully incompatible or mostly incompatible according to geomorphic compatibility score. Lower amount of points consider scores based on AOP and geomorphic compatibility. Scores with the least amount of points will go to a project that will replace (or remove) a structure that has a score that indicates full AOP; OR is ranked as fully compatible according to geomorphic compatibility score; OR project does not include a road crossing replacement or removal component.

Stream Connectivity Potential and Habitat Enhancement

b. _____ (up to 6 points)

Project will reconnect fragmented instream habitat and significantly increase the amount of upstream aquatic resources accessible to anadramous, diadromous or resident fish species and re-establish a connection between upstream and downstream habitat for fish, freshwater turtles, amphibians, mussels or aquatic plants. In addition, the project will restore access to or enhance stream reaches determined as “high quality habitat” or having a “high restoration” potential. Greatest amount of points would go to a project that reconnects or enhances a significant length of stream miles within the watershed (HUC 12) identified as having “high quality” habitat or “high restoration potential” and no points would go to a project that does not improve the connection between upstream and downstream areas or enhance in-stream habitat.

Drainage Area

c. _____ (up to 3 points)

Project will contribute to stream passage or enhance habitat that will potentially affect a broader area of the HUC 8 watershed or service area. The larger the watershed area above the activity, the more likely the project will improve the aquatic organism passage and/or habitat at a broader scale. Note that the watershed area should be calculated from the stream crossing location or the lowest point of the enhancement/restoration activity in the Project Area. More points go to tier 3 crossing and the least amount of points goes to enhancement of ephemeral stream habitat.

Water Quality

d. _____ (up to 6 points)

Project will implement a best management practice (i.e., buffer creation/enhancement or storm water treatment) that will result in an increase in water quality. If more than one best management practice is proposed, the improvement with the greatest treatment will be considered for scoring. For a buffer improvement to receive full points, the buffer improvement must pertain to both sides of the stream. Points will also be distributed based on the amount of water quality improvement relative to the receiving stream reach and identified impairments to the stream. Greatest points will go to a project that results in a buffer

enhancement/creation with a width greater than 100 ft., or stormwater treatment prior to discharge to a stream or river with a 75% or greater pollutant load reduction. No points will go to a project that does not provide water quality improvements.

Hydraulic Vulnerability

e. _____ (up to 6 points)

The project will improve a stream reach, or remove a crossing that overtops, which degrades water quality and instream aquatic habitat by increasing sediment loads into the river, eroding stream banks, and is susceptible to washouts of road fill material. Project will replace or remove a stream crossing or enhance stream/riparian areas that are known to experience flooding and have been identified as a past or potential flood issue, or is predicted to overtop/fail during specified flood intervals based on a hydraulic capacity model. Greatest amount of points will be awarded to a project that will improve stream passage and hydraulic capacity of a stream crossing that lies within a flood-prone area that is frequently flooded; OR that is predicted to frequently fail/overtop by a hydraulic model (generally a 2-25 year or greater storm event). No points will be awarded to a stream passage improvement project that lies in an area that is not considered prone to floods AND passes a two-year and greater flood by a hydraulic model.

Appendix B

Table 8 – ARM Fund Project Summaries

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
		Androscoggin Service Area
2011 **Greenough Ponds** Wentworth/Errol	$2,589,000 **$89,000** 3%	**1** – The Trust for Public Lands acquired a fee interest in 938 acres of land in Wentworth that included the entire shorefront of Greenough Pond and Little Greenough Pond – two of only three ponds in New Hampshire that sustain wild non-stocked brook trout populations, making them one of the state's premier cold water fisheries. Additionally, the property contains over 56 acres of wetland communities. The property connects to the 13-Mile Woods Community Forest, and the Umbagog National Wildlife Refuge.
2015 **Milan Community Forest** Milan	$91,000 **$61,000** 67%	**2** – The Town of Milan used funds to permanently protect, through a conservation easement, 6.6 acres of land to add to the Milan Community Forest. The property is located on the Androscoggin River with approximately 420 feet of river frontage; 13% of the parcel is in the 100-year flood plain.
		Saco Service Area
2013 **Green Hills** Conway	$1,002,575 **$46,000** 5%	**3** – The Nature Conservancy permanently protected the 1,014-acre Marshall property in Conway, including its approximately 56 acres of high-quality, headwater wetlands and on-site adjacent uplands. The parcel links the Green Hills Preserve and other connected conservation land to the north and west with an additional 240 acres to the east, creating a 6,500 acre block of conserved land. The property includes 6.5 miles of tributary streams, encompassing virtually the entire Mason Brook watershed. Mason Brook flows into an important aquifer recharge area along the Saco River, just south of the property, helping to maintain water quality in many downstream private and commercial wells.
		Pemigewasset-Winnipesaukee Service Area
2010 **Tioga River WCA** Belmont	$34,398 **$28,738** 84%	**4** – The Town of Belmont used funds to eradicate Glossy Buckthorn in the Tioga River Wildlife and Conservation Area. The invasion was considered a significant threat to Prime Wetland 18, one of the highest ranking wetlands in Belmont. Wetland enhancement and control methods were implemented to eliminate and manage invasive species on the site.
2010 **Coffin Brook** Alton	$92,000 **$23,000** 25%	**5** – The Town of Alton used funds to enhance 30 acres of a floodplain wetland system by installing a series of floodplain culverts to restore hydrologic connectivity and prevent flooding into the road surface by allowing flow during storm events. Installation of selected 45-inch wide by 29-inch high elliptical culverts improved passage in the floodplain.
2010 **Strolling Woods** Franklin	$551,672 **$131,500** 24%	**6** – The City of Franklin used funds to restore wetlands, provided water quality improvements to Webster Lake, and conserve 15 acres that adjoin a 226-acre parcel funded by the NRCS Wetland Reserve Program.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2011 **Snake River** New Hampton	$125,097 **$95,097** 76%	**7** – The Town used funds to protect 8.1 acres of land with a conservation easement on the Snake River. This property includes 1,560 linear feet of frontage along the Snake River, which flows from Lake Winona into Lake Waukewan – the drinking water supply for the Town of Meredith.
2012 **Hazelton Farm** Hebron	$300,000 **$100,000** 33%	**8** – The Society for the Protection of New Hampshire Forests (Forest Society) purchased a conservation easement on 275 acres that included vegetated buffers for two streams, and that overlies a stratified drift aquifer, helping to protect the water quality of Newfound Lake. The property has 0.6 miles of frontage on the Cockermouth River, and 1.5 miles of frontage on Wise Brook – a stream designated by the Town for buffer protection. There are 35 acres of agricultural fields with important agricultural soils that are managed for hay. The parcel is within a focus area of the Quabbin to Cardigan Conservation Initiative, Lakes Region Conservation Plan and is a priority area for the Hebron Conservation Commission, Newfound Lake Region Association (NLRA) Watershed Master Plan (2009), and the NLRA Land and Watershed Committee.
2013 **Frazian Property** Hebron	$230,000 **$175,000** 76%	**9** – The Forest Society purchased a conservation easement on 197 acres of the Frazian property in Hebron, located near the north end of Newfound Lake at the end of Braley Road. Its entire western boundary abuts the 272-acre Hazelton easement and its southernmost boundary is directly across the road from conserved land on Newfound Lake. The property includes over 32 acres of wetlands, 770 linear feet of undeveloped shoreline along the Cockermouth River and two small brooks, which all drain to Newfound Lake.
2013 Fogg Hill Bog Center Harbor	$222,500 $98,500 44%	**10** – The Fogg Hill Bog wetland restoration and land conservation project conserved 192 acres in Center Harbor, and includes: a prime wetland; the only kettle hole bog in Center Harbor; several significant ecological areas with extensive wildlife habitat for moose, bear, deer and turkey; rare plant species; two old growth forest patches; one of the highest hills in town with high visibility; and the immediate watershed to Lake Waukewan (a public water supply). The property is located within one of the highest conservation priority areas based on the Town Natural Resources Inventory (2011). It lies within Center Harbor's largest unfragmented forest block (950 acres).
2014 **Lake Wicwas** Meredith	$533,790 **$64,236** 12%	**11** – The Lakes Region Conservation Trust (LRCT) and Lake Wicwas Association used funds to permanently protect four separate parcels in the northeast part of the lake that included a total of 27.44 acres of land and one mile of shoreline on Lake Wicwas in Meredith. The parcels protected include four potential vernal pools, an island and the largest marsh area (12.5 acres) within the lake, which provides habitat for the only nesting loon pair in the area.
2016 **Page Pond Community Forest** Meredith	$1,127,000 **$107,500** 10%	**12** – The Trust for Public Lands protected 206 acres on Meredith Neck with direct frontage on Page Pond. The Town of Meredith, acting through its Conservation Commission, is the long-term landowner and land manager. The area includes prime wetlands, 330 linear feet of Page Brook and 2,875 linear feet of an unnamed brook that flows directly into Lake Winnipesaukee. This project provided connectivity across Meredith Neck to create a large block of conserved land.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
		Salmon Falls-Pistacaqua Service Area
2010 **Berry Brook Restoration** Dover	$638,096 **$440,000** 69%	**13** – The UNH Stormwater Center and City of Dover restored and reconnected 0.9 miles of Berry Brook, a first-order stream that connects to the Cocheco River. The work included the restoration and creation of 1,960 feet of stream channel and removal of fish passage barriers, and provided significant treatment of 164 acres of watershed for diadromous fish and other aquatic species. Berry Brook was improved by two approaches: 1) wetland and stream restoration, buffer development and conservation, and 2) base flow and water quality improvements.
2010 **Exeter River Project** Brentwood	$128,888 **$78,468** 61%	**14** – The Brentwood Conservation Commission preserved 16 acres of frontage on the Exeter River, and completed 0.3 acres of riparian enhancement to improve water quality and wildlife habitat. The project expanded on projects identified in the Exeter River Geomorphic Assessment and Watershed-Based Plan: Middle Exeter River (2010 report).
2010 **River Road** New Castle	$34,242 **$27,993** 82%	**15** – The New Castle Conservation Commission, in partnership with the Rockingham County Conservation District, completed a project that provided 0.5 acres of salt marsh restoration. The wetland area that was restored is expected to perform multiple functions as it will provide high wildlife habitat value, sediment retention and nutrient removal, and has educational and aesthetic potential.
2010 **Odiorne Point** Rye	$49,076 **$43,000** 88%	**16** – The Rockingham County Conservation District used funds for 3.8 acres of restoration and 6.45 acres of enhancement work at Odiorne Point State Park in Rye. NHB defines the aforementioned sites as “exemplary natural communities,” of which the coastal salt pond marsh is the only one of its kind in the State. These significant habitats are home to two endangered, and two state listed threatened plant species.
2010 **Sprucewood Forest** Durham	$4,800,000 **$500,000** 10%	**17** – The Trust for Public Lands conserved 176 acres of land, including 142 acres of uplands, 34 acres of wetlands, 0.9 acres of floodplain forest, containing diverse wildlife habitat, natural communities, and frontage on the Oyster River. A significant portion of the property is contained within the Oyster River Conservation Focus Area identified in the NH Coastal Plan. This is a keystone property connecting over 2,200 acres of existing conservation land - including the isolated 36 acres Spruce Hole Conservation Area and other protected lands owned by UNH, Durham, and land trusts.
2010 **Siemon Family Trust** Durham	$221,118 **$29,300** 13%	**18** – NHFG was gifted the value of a conservation easement on 366.1 acres of land with 1.9 miles of riparian corridor along Jones Brook and funds were used to complete components of the land transaction. The property consists of 44.75 acres of WAP Tier 1, Highest Ranked Wildlife Habitat by Ecological Condition in the State; 73.65 acres of WAP Tier 2, Highest Ranked in Biological Region; and 239.23 acres of WAP Supporting Landscape.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2010 **Evans Mountain** Strafford	$947,855 **$367,750** 39%	**19** – The goal of the project was to permanently protect the natural resources on the 1,015-acre Evans Mountain property in Strafford. This parcel is part of a 6,000-acre unfragmented forest that includes headwater streams of Bow Lake and the Nippo Brook/Isinglass River in the Salmon Falls - Piscataqua River watershed and the Big River in the Merrimack River watershed, as well as 67 acres of wetlands (almost evenly split between the two watersheds). This project included a wetland restoration and aquatic resource improvement component to restore 18 sites, covering 7,000 square feet, impacted by roads and other activities from resource extraction by prior owners.
2013 **Huppe Farm** Farmington	$102,200 **$75,000** 73%	**20** – The funds were used to protect 96 acres of land and establish a 200-foot no-cut buffer around the wetland and the portion of Berry Brook that flows through the land. The project included a conservation easement to be held by the Strafford Rivers Conservancy. The project will permanently protect six acres of wetland and 2,370 linear feet of Berry Brook and its tributary, which flows to the Isinglass River. The protection of this parcel was a priority by the state-funded Land Conservation Plan for the Coastal Watershed and the Isinglass River Management Plan.
2013 **Calef Isinglass River** Barrington	$1,100,000 **$100,000** 9%	**21** – The Town of Barrington acquired the 270-acre property owned by the A. Harlan Calef Revocable Trust. The project permanently conserved 16 wetland complexes (75.81 acres), 13 vernal pools, 70.3 acres of floodplain forest, 1.5 miles of frontage on the Isinglass River and 261 acres of forested uplands. According to NHB, both Spotted Turtle (S2) and Wood Turtle (S3) have been identified on the property; Blanding's Turtle (S1) have been identified within close proximity to the property.
2014 **Berry's Brook** Rye	$1,260,000 **$121,000** 10%	**22** – The Rye Conservation Commission purchased and permanently protected approximately 73 acres of the former Rand Lumber Yard property, located on Wallis Road in Rye. This parcel will contribute to existing protected lands, as it located within a large contiguous block of open lands. A significant wildlife corridor extends easterly toward the Bellyhack Bog and tidal estuary that is within a mile. The wetlands found on site are mainly forested, with several potential vernal pools.
2014 **Exeter Great Dam** Exeter	$1,968,854 **$100,000** 5%	**23** – The Town of Exeter used funds to remove the Great Dam in downtown Exeter. The project benefits the diadromous fish populations in the Exeter River and the wider Great Bay Estuary, enhances the natural and human ecosystem by improving water quality, and reduces Exeter's vulnerability to the growing risk of flooding. The removal project restored approximately 15 miles of the Exeter River and its tributaries to a free-flowing condition, eliminating a barrier to migrating anadromous fish and improving water quality. The project also included reshaping the river channel within the footprint of the existing dam, and the areas immediately upstream and downstream, using a natural channel design approach based on established fluvial geomorphic principles.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2014 **Spruce Swamp** Brentwood and Fremont	$79,841 **$15,000** 19%	**24** – The Southeast Land Trust of New Hampshire (SELT) used funds to protect a 32-acre property with 8 acres of wetland and 24.18 acres of upland buffer in the regionally significant Spruce Swamp. The Spruce Swamp Area and its surrounding forest are one of the few wilderness areas remaining in southern New Hampshire. The Swamp is an 824-acre fen nestled in a 1,700+-acre unfragmented forest.
2015 **TNC Oyster Restoration** Newington	$239,628 **$190,500** 79%	**25** – The UNH Jackson Estuarine Laboratory used funds to improve water quality in the Great Bay Estuary by retaining nutrients and trapping sediments through oyster reef restoration. Secondary goals and benefits will restore fish and aquatic habitat, ecological integrity, and wetland-dependent wildlife habitat. The project restored five acres of oyster reef. Reefs were restored by placing a total of 500 cubic yards of clean surf sand into the estuary, and seeding the areas with live oysters raised at the Jackson Estuarine Laboratory.

Cutts Cover tidal marsh restoration and living shoreline, Portsmouth, NH

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2015 **Powder Major's Farm and Forest** Madbury, Durham and Lee	$1,997,263 **$148,000** 7%	**26** – The Forest Society used funds to purchase 195 acres of land to create a new forest reservation open to the public. The three towns in which the project is located hold conservation easements on their respective portions of the project in exchange for town funding to the project. The parcel contains 84 acres of wetlands, 5,100 feet of frontage on the Oyster River (the drinking water source for Durham and UNH), 800 feet of frontage on Dube Brook and overlies an aquifer. Three confirmed vernal pools are on the parcel, several rare plants; there is also documentation for Blanding's turtle, American eel and 12 other occurrences of rare and threatened wildlife within the Oyster River corridor. The property is entirely within the focus area of The Nature Conservancy's Land Conservation Plan for NH Coastal Watersheds and is part of a larger, 3-town greenbelt conservation initiative. It abuts and enlarges other conservation lands including tow town-owned conservation easements, and wraps around a newly acquired 87 acre town property.
2015 **Cutts Cove** Portsmouth	$354,000 **$135,736** 38%	**27** – The UNH Stormwater Center restored several tidal marsh types that reflect the current distribution of low and high marsh, and tidal buffer zones, relative to the tidal regime at the site. Restoration included portions of Cutts Cove by: 1) enhancing the diversity and quality of 90,000 sq ft of mudflat habitat through addition of native shell substrate; 2) creating a living shoreline of rock sill with shellfish, expanding a remnant patch of existing salt marsh by 40,500 sq ft and creating a vegetated tidal buffer zone (8,000 sq ft); 3) Removal of 700 linear feet of armoring along the Cutts Cove shoreline; and 4) Improved (created) 8,050 sq ft of Tidal Buffer Zone with functional connections to marsh and upland along 700 feet of artificial shoreline, providing for future migration.
2016 **Upper North Branch River Property** Candia	$125,000 **$30,000** 24%	**28** – SELT protected approximately 14.85 acres of wetland including 8 large vernal pools, nearly 900 feet of river/stream shoreline, and approximately 102 acres of upland buffer in the regionally significant Upper North Branch River Core Focus Area (as identified by the Land Conservation Plan for New Hampshire's Coastal Watersheds). As part of a large unfragmented block over 5,000 acres in size, the property contains 88 acres of Tier 1 habitat and 33 acres of Tier 2 habitat. A NHB report shows that the property has a population of the state-threatened (S2) Appalachian barren-strawberry within the conservation easement area. The property is within a Blanding's turtle priority conservation area identified by NHFG. This site ranks second out of the top 10 focus areas in New Hampshire and connects the property's habitat to an existing 388-acre block of conservation land.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2016 **Horsburgh Property** Fremont	$1,308,685 **$85,000** 6%	**29** – SELT acquired 343 acres of land, including 4,107 linear feet of Brown Brook, which is a tributary to the Piscassic River. The property includes several streams that flow into Brown Brook and 3,135 linear feet of an unnamed tributary to the Exeter River. The property includes 71.5 acres of high-value wetlands, including portions of five Prime Wetlands, and 29 probable vernal pools. The property is almost entirely ranked as "Highest Ranking Habitat in the State" in the WAP and is within a "High Priority" site for Blanding's turtles identified in the "Conservation Plan for Blanding's Turtle and Associated Species of Conservation Need in the Northeastern United States."
2016 **Isinglass River Floodplain** Barrington	$337,845 **$61,545** 18%	**30** – The Isinglass River conservation easement encompasses approximately 53 acres in Barrington and abuts approximately 327 acres of contiguous conservation land. The property includes nearly six acres of important high-value wetlands, one documented functioning vernal pool and two probable vernal pools. This parcel creates a contiguous block of 380 acres of conservation land, all of which is located just down river from the 300-acre Calef Forest project. In addition, the conservation easement will ensure that the approximately three-mile long "Barrington Trail," which extends along the property's Isinglass River frontage all the way to the Town ball fields on Smoke Street, remains open to public access. The property will be permanently conserved through a SELT-held conservation easement, with an Executory Interest to the Town of Barrington. The property is located within a 1,200-acre unfragmented forest block.
2016 **Sawyer Mill Dam Removal** Dover	$1,600,000 **$149,805** 9%	**31** – The Sawyer Mill Dam Removal on the Bellamy River restored fish passage, improved instream habitat and water quality, and reduced flood hazards. Removal of the two mill dams restored access for American eels, passage for alewife, blueback herring and sea lamprey, all of which are identified as species of "special concern" and "species of greatest conservation need" by NHFG. The project also reconnected 11.2 miles of main-stem riverine habitat to Great Bay.
2016 **Upper Oyster River** Barrington	$350,000 **$50,000** 14%	**32** – The Upper Oyster River Passage Project proposed to replaced the highest priority road/stream crossing culvert in the Oyster River watershed to restore natural stream channel dynamics and function on an impacted reach of the Oyster River. The project proposes to restore full fish passage to approximately four miles of upstream riverine habitat in the headwaters of the Oyster River and its tributary streams for the benefit of American Brook Lamprey (state endangered species), Eastern Brook Trout, American Eel, and other important aquatic species. The project includes the permanent protection, through a deed restriction, of approximately 12 acres of undeveloped land adjacent to the Oyster River and the 1,528-acre Samuel A. Tamposi Water Supply Reserve land.
2016 **Rollins Brook Headwaters** Nottingham	$466,278 **$48,240** 10%	**33** – The Southeast Land Trust used funds to protect 70 acres of forest and 17 acres of wetlands, including a 13-acre beaver pond. The property's aquatic resources serve as the headwaters for Rollins Brook, a tributary to the North River, Lamprey River, and the Great Bay Estuary. The property has three confirmed vernal pools, 1,000 feet of headwater stream (currently impounded by beaver dam), and 52 acres of associated upland habitat. The project proposes to restore and enhance critical wildlife habitat, with a particular focus on the state endangered Blanding's turtle, which is known to occupy this parcel. This property connects to more than 2,000 acres of protected lands east of Pawtuckaway State Park.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
		Merrimack Service Area
2009 **Nesenkeag Brook** Londonderry	$19,400 **$19,400** 100%	**34** – The Town of Londonderry used funds to review the hydrologic conditions and invasive species establishment to assess the restoration potential for future wetland enhancement opportunities. The restoration of the Nesenkeag Brook Headwaters site attempted to restore certain functions to a degraded wetland ecosystem.
2009 **Oxbow Property** Canterbury	$810,000 **$300,000** 37%	**35** – The Forest Society purchased a conservation easement protecting 294 acres in Canterbury. Protecting this land is of critical conservation importance as it includes 26 acres of wetlands and two miles of undeveloped shoreline on the Merrimack River, as well as exemplary plant communities and habitat for several state-listed plant and animal species.
2009 **Clay Pond** Hooksett	$1,265,000 **$200,000** 16%	**36** – Bear-Paw Regional Greenway (Bear-Paw) used funds to protect approximately 733 acres of high-value wildlife habitat in the Clay Pond Headwaters area, including over 130 acres of wetlands, vernal pools and exemplary natural communities. It was protected by combining town ownership with a conservation easement(s) held by Bear-Paw.
2009 **Stewart Property** Francestown	$173,000 **$48,000** 28%	**37** – Funds were used to purchase, fee simple, 55 acres of the Stewart land in Francestown with an easement held by the Francestown Land Trust. This purchase protects over 5,000 linear feet of shoreline along Rand Brook and the South Branch of the Piscataquog River, including enhancement involving two acres of wetland restoration of the riparian buffer and the removal of invasive species in both wetlands and uplands.
2012 **Plaistow Town Forest** Plaistow	$127,381 **$100,000** 79%	**38** – The Town, with assistance from SELT, worked to place conservation easements on lands acquired through tax default, totaling 350 acres. There are 17 parcels known, or believed to be owned by the town, which have been managed as town forests for the forest resources. The project conserved an unfragmented block of land that encompasses more than 490 acres. The town forests are mature forests dominated by Appalachian Oak-pine and more than 1.2 miles of riparian corridor along Kelly Brook. There are at least six beaver impoundments that encompass more than 60 acres along inlet streams and the main stem of Kelly Brook, with numerous vernal pools and an active heron rookery.
2012 **Soucook River-Therrien Forest** Canterbury	$89,330 **$68,830** 77%	**39** – Five Rivers Conservation Trust purchased a conservation easement that protects approximately 119 acres of forest and wetland in the headwaters of the Soucook River watershed. The property includes 16 acres of marsh and open water, 2,240 feet of streams, and five vernal pools, with more than 12,630 feet of riparian shoreline. Otter Pond and New Pond are on the property and this area is a conservation priority in the Canterbury Master Plan. The property has over 4,000 feet of frontage on Ames Road, a class VI road used for recreation. Water bars and erosion improvement measures were constructed along the road to eliminate drainage into the pond, a portion of the road was relocated to avoid sensitive shoreline plants and roads have been closed to ATV and 4-wheelers.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2012 **Avery Brook** Francestown	$462,000 **$235,290** 51%	**40** – The project involved the purchase of a conservation easement by Francestown Land Trust to protect 182 acres of land, which is the entire catchment of Avery Brook as it meanders through forestland and exemplary wetland communities to its confluence with the Piscataquog River. Restoration work included lowering a perched culvert, installing water bars on a logging road, and enhancing 200 feet of a riparian buffer. No-cut buffers around aquatic resources were included in the conservation easement. The Avery Brook catchment connects and enhances the ecological function of over 3,700 acres of biologically diverse protected land. The property includes the entire length of Avery Brook west, nearly all of Avery Brook East, and frontage along the South Branch of the Piscataquog River.
2012 **Himan Pond I** Hooksett	$1,088,238 **$503,739** 46%	**41** – Bear-Paw and NHFG conserved 460 acres of high-value wildlife habitat on Hinman Pond including over 76 acres of wetlands. The property was purchased by Bear-Paw, with a conservation easement held by NHFG. The parcel lies within a WAP conservation focus area that is greater than 20,000 acres in size. The parcel is primarily hemlock-hardwood-pine forest and includes the largest 100 acres of Appalachian-Oak-pine exemplary forest known in New Hampshire. Twenty seven wetlands on the property total 76 acres, including prime wetland, Hinman Pond and approximately 43 vernal pools. Three perennial streams, providing almost one mile of riparian habitat, flow to Dubes Pond and one flows north to Head Pond and then the Merrimack River. The Hinman Pond property provides critical habitat for several rare or endangered species including Blanding's and spotted turtles. The property abuts Bear Brook State Park and Manchester Water Works properties, and lies within the Lake Massabesic watershed, Manchester's public drinking water supply.
2012 **Crooked Run** Barnstead, Strafford and Pittsfield	$701,600 **$361,600** 52%	**42** – Bear-Paw purchased a conservation easement that conserved 600 acres of valuable wildlife habitat. The parcel includes 85 acres of wetlands, three miles of perennial streams, most of the frontage on 30-acre Adams Pond, and almost half of the frontage on Wild Goose Pond. The wetlands include 57 acres of marshland, 26 acres of other wetlands, two acres of peatland and Adams Pond. The unfragmented forest that includes Crooked Run is large – more than 2,000 acres in extent – connecting a 6,000-acre block that includes the Evans Mountain property and a 16,000-acre block just to the north. Nine restoration sites that total 16,900 square feet were restored, including removal of a bridge from a perennial stream and fill removal and slope stabilization adjacent to high-value peatlands.
2012 **Pennichuck Brook** Merrimack	$1,237,170 **$737,170** 60%	**43** – The Forest Society purchased a conservation easement on 192 acres of land consisting of two parcels located north of Pennichuck Brook. The western parcel included one mile of shoreline on Pennichuck Brook, which leads to the Pennichuck water supply – the City of Nashua's drinking water supply. The parcel contains endangered plants and exemplary communities. The eastern parcel contains a 26-acre beaver pond used as a heron rookery. Restoration included removing fill in a beaver pond, regrading ruts caused by ATV activity, unblocking an existing ditch to restore 3.35 acres of wetlands, and improving a small woods road crossing on the western parcel.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2012 **Merrimack Riverfront** Hooksett	$470,000 **$150,000** 32%	**44** – The Town of Hooksett received funds for the purchase of the 122-acre parcel to be protected by a conservation easement held by the Forest Society. The parcel includes 3,900 linear feet of frontage on the Merrimack River, 37 acres of wetlands within the 100-year floodplain of the Merrimack River, and 30.5 acres of one prime wetland. The entire parcel overlies a stratified drift aquifer and is within a source water protection area. The project had been identified by the Hooksett Open Space Plan as a high-priority for protection. The project area contains Tier 1 and Tier 2 habitats as identified by the WAP.
2013 **McQuesten Pond Dam Removals** Manchester	$200,200 **$65,400** 33%	**45** – New Hampshire Rivers Council used funds to remove two dams within McQuesten Pond that disrupted hydraulic connectivity, stream geomorphology and wetland functions, and were one of the primary sources of water quality impairment along with stormwater runoff. The ultimate goals of this project were to develop the plans to remove two obsolete stream barriers in McQuesten Brook that have artificially impounded water upstream to form McQuesten Pond, and then remove both barriers to restore stream and wetland functions, providing an additional 1,500 linear feet of brook trout habitat.
2014 **Hinman Pond II** Hooksett	$418,300 **$75,000** 18%	**46** – Bear-Paw used funds to aquire a property that lies within a conservation focus area identified in the 2010 WAP map that is more than 18,000 acres in size. The properties include 218 acres of land and contains 21 wetland complexes, totaling 25 acres. They range in size from a 0.02-acre vernal pools to a ten-acre beaver flowage. The majority of the wetland complexes are associated with depression systems and forested drainage ways. Nine vernal pools were identified throughout the site; however, NHFG has identified other potential vernal pools that may be productive in wetter years. There are no restoration opportunities on the parcel.
2014 **Guinea Ridge Road** Gilmanton	$181,432 **$168,432** 93%	**47** – Lakes Region Conservation Trust used funds to protect 86 acres of land in Gilmanton. The parcel is located within the focus area of the Belknap Range Conservation Coalition (BRCC). The project protects approximately 21 acres of wetlands and 65 acres of upland along a significant wetland and perennial stream resource located in the BRCC Focus Area. Approximately 3,600 linear feet of perennial stream buffers, upland buffers along the stream and a complex of wetlands were protected. The parcel establishes connections between lands that are not currently protected. In addition, the parcel provides connections between a 91.6-acre wetland, a perennial stream that is in the headwaters to the Suncook River and a 10-acre upland island, providing superb aquatic resource connectivity in this region.
2014 **Shost** Goffstown	$300,000 **$150,000** 50%	**48** – The Forest Society, in partnership with the Goffstown Conservation Commission, permanently protected an undeveloped 177-acre property through the purchase of a conservation easement. This protected important wetland and stream buffers, vernal pools, approximately 16.9 acres of active open fields for hay production and wildlife habitat, and about 147 acres of managed, working forests. The property includes one large, 22-acre open wetland complex that was designated as prime in 2005, several smaller forested wetlands, at least three vernal pools and an unnamed perennial stream that drains south to the Piscataquog River and then to the Merrimack River. The Shost property has 1,275 feet of frontage along Snook Road and could easily have been subdivided.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2015 **Black Brook Preserve** Goffstown	$249,576 **$70,000** 28%	**49** – The Piscataquog Land Conservancy (PLC) pre-acquired the 101-acre parcel using bridge financing from The Conservation Fund, as it was in imminent danger of being sold for development. The PLC stepped in as an interim buyer with borrowed funds, and currently holds the land with no conservation restriction. The Town of Goffstown signed a purchase and sales agreement with PLC to provide funds to acquire a conservation easement on the property and towards additional project costs. The property abuts and expands PLC's 126-acre Blackbriar Woods Preserve, and provides protection for 23.24 acres of wetlands – a third of which are designated as prime – along the southern boundary, 13 vernal pools, 2,900 linear feet of Black Brook, roughly 3,000 linear feet of intermittent stream and approximately four acres of open-water beaver ponds. The property's entire southern boundary along Black Brook is designated as Prime Wetland. There are documented sightings of Blanding's and Wood Turtles on the property.
2015 **McQuesten Brook Stream Restoration** Bedford and Manchester	$900,000 **$354,000** 39%	**50** – The New Hamsphire Rivers Council worked with the Town of Bedford in the McQuesten Brook watershed, which covers 563 acres. McQuesten Brook originates in Bedford, flows into Manchester, and collects outlet waters from McQuesten Pond before flowing under Second Street, through the Eastman Avenue and Wathen Road wetland complex in Bedford, and under the Everett Turnpike to meet the Merrimack River. The two stream crossings that carry McQuesten Brook through the wetland complex were severely undersized and listed in the 2012 305(b)/303(d) Surface Water Quality Assessment for failure to support aquatic life due to insufficient dissolved oxygen concentrations and saturation, and excessive chlorides. These impairments threaten the survival of naturally reproducing Eastern Brook Trout populations present in portions of McQuesten Brook. The project installed an adequately sized (14-foot width) stream crossing at Eastman Avenue and removed the culvert at Wathen Road to restore hydraulic and sediment transport capacity throughout the reach. Restoring full aquatic organism passage at both Eastman Avenue and Wathen Road will increase access to about 1,950 feet of McQuesten Brook between I-293 and South Main Street. The project re-connected 2.57 acres of wetland habitat within this reach of McQuesten Brook.
2015 **Wild Goose Pond** Pittsfield	$927,910 **$217,200** 23%	**51** – Bear-Paw permanently protected two Pittsfield properties with more than 500 acres in the Wild Goose Pond watershed. The conservation easements include 38 wetland areas covering over 68 acres (including 12 vernal pools), over one mile of riparian habitat and 1,000 linear feet of frontage on Wild Goose Pond. The project includes six restoration sites, which are associated with woods road culvert crossings.
2015 **Haller Farm Preservation** Concord	$620,000 **$300,000** 48%	**52** – The City of Concord was awarded funds for the acquisition of two parcels, totaling approximately 100 acres, located off of Lakeview Road and West Parish Road in the Penacook Lake Watershed. Penacook Lake is the City of Concord's primary source of drinking water and is designated as a class "A" water body. The majority of the Haller Farm property consists of forested upland with sloping hills that drain toward the lake and contains palustrine wetlands, intermittent and perennial streams, and vernal pools. Acquisition of the Haller land linked other protected land in the area, adding to a block of approximately 900 acres of conservation land within the Penacook Lake Watershed. Public access is provided.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2016 **Portsmouth Street Stream Restoration** Concord	$400,000 **$100,000** 25%	**53** – The City of Concord will restore Mill Brook and Merrimack River floodplain connectivity, and restore the stream channel so it is similar to natural conditions upstream. The project will replace an undersized culvert with a 16 x 3-foot three-sided culvert that will pass the 100-year storm. This increase in crossing size will restore Merrimack River floodwater access to approximately 4.7 acres of wetlands upstream of Portsmouth Street.
2016 **Tower Hill Pond** Candia and Hooksett	$2,284,070 **$400,000** 18%	**54** – The Forest Society used funds to conserve 1,870 acres of land, including Tower Hill Pond in Manchester. The project will permanently conserve 45 separate wetlands encompassing 280 acres, over 2 miles of undeveloped shoreline of Tower Hill Pond, 6.3 miles of perennial streams, 1.6 miles of intermittent streams, 74 vernal pools and 1,590 acres of upland and lowland forest. The land contains a portion of the 8,000 acres owned and managed by Manchester Water Works that provides drinking water to the over 160,000 residents of the City of Manchester and surrounding towns.
2016 **Mathes Properties** Londonderry	$829,570 **$400,000** 48%	**55** – The project permanently conserved two parcels, totaling 149 acres, adjacent to the Musquash Conservation Area through a partnership between Southeast Land Trust and NHFG. Parcel 1 is 140 acres with 18.7 acres of wetlands and includes a large wetland system and nine documented vernal pools (confirmed wood frog and spotted salamander egg masses) and five additional potential vernal pools. These features are a part of the large Musquash Swamp wetland system. Parcel 2 is 10 acres, located northeast of Parcel 1 and adjacent to the Musquash Swamp Conservation Area, and contains one acre of wetland. A recent timber harvest on the parcel impacted the landscape surrounding the pools. The property is also located in a focus area identified for recovery of the New England cottontail (NEC), a state endangered species. Parcel 1 has the potential for the creation of high-quality habitat for the species through management in the upland forest on the property.
2016 **Salem Town Forest** Salem	$800,550 **$150,000** 19%	**56** – SELT, working with the Town, acquired a conservation easement on approximately 100 acres in Salem along Hittytity Brook, which abuts the 206-acre Salem Town Forest. Conserving this parcel will create a contiguous block of 345 acres of conservation land in Salem. The property includes approximately 22.5 acres of a high-transmissivity aquifer that is located in the area of Hittytity Brook. This aquifer has been considered as a potential water supply by the Town due to its productivity. Conserving this property will help preserve this potential future public water supply.
2016 **Austin Parcel** Brookline	$510,000 **$89,000** 17%	**57** – The Brookline Conservation Commission used funds to acquire the 23-acre Austin Parcel, which has 3,000 linear feet of riparian frontage along the Nissitissit River. The Town placed a conservation easement on the property, which is held by the Piscataquog Land Conservancy. The parcel contains a riverine complex with an intermittent stream, and palustrine forested, emergent and scrub-shrub wetlands. Protection of the frontage and upland buffer is a high priority in the region and this is one of the last large sections of the river that had not been protected or developed in New Hampshire. This river reach offers an impressive Eastern Brook Trout fishery, and both NHFG and Trout Unlimited have expressed interest in seeing it protected. The WAP depicts the property as being a combination of highest ranked habitat in New Hampshire and highest ranked habitat in biological region. The area is open for public use.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2016 **Brennan Brook Confluence** Francestown	$112,350 **$83,850** 75%	**58** – The Francestown Land Trust purchased a 7.6-acre property along the South Branch of the Piscataquog River, and protected an additional 33 acres of land with conservation easements donated by abutting landowners. The Piscataquog Land Conservancy will hold the conservation easement for the property. The project will permanently protect 2,155-feet of the South Branch of the Piscataquog River, its associated riparian and upland forest, as well as eight acres of wetlands at the confluence of Brennan Brook. Approximately 10.5 acres in this project area is classified by the WAP as highest ranked habitat (Tier 1), 17 acres is considered Tier 2 habitat, and 4.5 acres is ranked as supporting landscape (Tier 3). According the NHB report, the endangered Blanding's turtle and two species of special concern – smooth green snake and wood turtle – have been found in the area. This project connects to and enhances the ecological function of over 4,500 acres of biologically diverse protected land. Public access is provided.
2016 **Hitchiner Town Forest** Milford	$19,506 **$8,260** 42%	**59** – The Milford Conservation Commission permanently protected the 193-acre Hitchiner Town Forest and the natural resources on the property with a conservation easement to be held by the New England Forestry Foundation (NEFF). Management is being guided by a Forest Management Plan, which was updated in 2008, and a Field Management Plan created in 2012. The upland on the property is considered highest ranked habitat in the biological region in the WAP. A chestnut oak forest/woodland occupies approximately 30 acres on the upper slopes of Milford's Hitchiner Town Forest property. This forest type reaches the northern extent of its range in New Hampshire, and is ranked imperiled/critically imperiled in the state. Much of the land surrounding the Town Forest is under residential development and placing an easement on the property will sustain the natural landscape.
		Lower Connecticut Service Area
2010 **Colony Project** Chesterfield	$140,000 **$83,467** 60%	**60** – The Monadnock Conservancy acquired a conservation easement on 300.9 acres of land with 32 acres of wetlands, seven acres of source water protection area, approximately 8,000 feet of streams and eight vernal pools. This parcel is part of a much larger effort by the Conservancy to protect conservation lands in the "California Brook Natural Area," which includes 9,000 acres of undeveloped forestland and wetlands connecting West Hill in Keene with Pisgah State Park.
2012 **Beaver Brook** Keene	$341,299 **$277,707** 81%	**61** – The City of Keene restored approximately one acre of historically filled wetlands and conducted stream restoration within the Beaver Brook watershed. The restoration advances the on-going effort to restore Beaver Brook, and augment flood storage in this area of the City, and creates additional scientific and educational opportunities that complement on-going projects within the watershed. The parcel is contiguous with Robin Hood Park, which is a 110-acre conservation parcel. Invasive species will be removed, mainly a large Japanese knotweed colony. Research of the parcel deed and two abutting parcels is also proposed to potentially protect the area in perpetuity.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2012 **Hanchetts Brook Forest** Plainfield	$156,920 **$110,560** 70%	**62** – The Upper Valley Land Trust purchased a conservation easement on a 101-acre parcel to permanently protect 1,750 feet of stream and 0.5 acres of wetlands along Hanchetts Brook. Hanchetts Brook flows from Sky Ranch Pond, a deep emergent marsh with surrounding shrub marsh encompassing about 10 acres. Much of the Sky Ranch Pond watershed is under the protection of a UVLT easement, however that easement does not include a riparian buffer around the shore. The owner of the pond is willing to donate additional restrictions around the pond to leverage this project. Hanchetts Brook flows approximately 5,870 feet from Sky Ranch Pond to the Connecticut River. The protection of a significant portion of Hanchetts Brook will benefit water quality in the area and may serve to benefit potential NHB species.
2014 **Falls Brook** Swanzy	$250,527 **$180,000** 72%	**63** – Cheshire County Conservation District, with assistance from Trout Unlimited, improved aquatic organism passage, particularly for brook trout, at the Falls Brook culvert located on Hale Hill Road, which is two miles upstream of the mainstem Ashuelot River. Falls Brook sub-watershed was identified as the second-highest priority sub-watershed due to the amount of high-quality cold water headwaters habitat throughout this stream network. The majority of Falls Brook consists of excellent brook trout thermal refugia and spawning habitat. The restoration replaced the undersized culvert, which was also potentially hazardous to community infrastructure and stream geomorphology during extreme storm events.
2014 **West Hill-California Brook Natural Area** Keene, Swanzey and Chesterfield	$344,253 **$140,000** 41%	**64** – The Monadnock Conservancy used funds to acquire two conservation easements on the 552-acre West Hill Property that protect 25.8 acres of wetland, 526 acres of upland, approximately 16,850 feet of streams, 13 potential vernal pools and 3 known vernal pools. The project includes some acreage subject to "forever wild" restrictions as part of the landowner negotiations. The conservation easement on the larger tract will allow for forest management and includes a 100-foot riparian buffer in order to protect the aquatic resources. The West Hill property consists of six wetlands that provide shoreline stabilization for streams and ponds, four perennial streams associated with the wetlands (including a beaver pond) that provide fish and aquatic habitat, with all of these streams flowing into the Ashuelot River.
2015 **Smith Pond Property** Enfield	$2,616,600 **$362,385** 14%	**65** – The Upper Valley Land Trust was awarded funds for fee acquisition of 995 acres of the Smith Pond Shaker Forest property in Enfield. The property contains 114 acres of wetlands, 16,900 feet of perennial stream and 13,100 feet of intermittent streams – totaling almost six miles of stream habitat and 5.2 miles of stream-bank on perennial streams. The remote 68-acre Smith Pond is the stunning wetland centerpiece of the property and it is surrounded by other high-quality wetlands and mature forest. It has a total of 17,560 feet of pond shoreline and encompasses over 15 different types of wetlands including: large pond, forested wetland, high-gradient streams with pools, medium gradient stream with associate riparian wetlands in some meanders, emergent marsh, vernal pools and even two beautiful waterfalls. Intact forested buffers will cover at least 370 acres of the property and over the long-term, should provide the highest quality context for all of the wetlands and streams, particularly as natural levels of course woody debris are added to the various ecosystems. Restoration opportunities exist in areas impacted by previous logging operations.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2015 **Ashuelot River Floodplain Restoration and Protection** Swanzey	$197,279 **$147,615** 44%	**66** – Over 29 acres of floodplain forest, hayfield and high-quality oxbow wetlands was permanently protected by a conservation easement along 1,500 feet of the State-Designated Ashuelot River. Eleven acres of riparian wetland area along the Ashuelot River, which are currently hayfield, and areas surrounding 5.5 acres of oxbow wetlands will be restored to floodplain forest. Located in the Lower Basin Aquifer in southern Keene and northern Swanzey, the water-bearing capacity of this property is described as "highly favorable for groundwater supply development based on excellent water quality and yield" (Results of Hydrogeologic Investigations Lower Ashuelot River Basin, Keene, NH 2004). The WAP ranks the majority of the project area as Tier 1, highest ranked habitat in the state. The area is particularly important to wildlife movements as it connects the 1,500-acre Mount Cresson-Town of Swanzey conservation land and the Yale-Toumey Forest to the Ashuelot River valley.
2016 **Sip Pond** Fitzwilliam	$153,435 **$105,000** 68%	**67** – The Monadnock Conservancy acquired the 72-acre Chamberlain property, located on the southern shore of Sip Pond. The predominant feature of the property is the wetland, which is part of the 352-acre Sip Pond Peatland Complex. The parcel has 2,200 feet of frontage on Sip Pond and 2,100 feet of frontage along Sip Pond Brook. The property is within two wellhead protection areas and 95% (68.6 acres) of the property overlies a stratified drift aquifer. This wetland complex represents one of the highest quality wetlands in Fitzwilliam, if not the region.
2016 **Ticknor Woods Project** Lebanon	$296,000 **$168,500** 57%	**68** – The Upper Valley Land Trust (UVLT) purchased 110 acres of forested property in Lebanon, protecting 18 acres of wetlands, 1,300 linear feet of perennial stream, 855 feet of Mascoma River frontage and 2,400 linear feet of intermittent stream. The parcel is adjacent to the 76-acre, permanently protected "Ticknor Woodland" property, owned by the City of Lebanon and protected with an UVLT-held conservation easement. The conservation easement will ensure and provide for continued public access for low-impact activities consistent with overall aquatic resource protection.

Falls Brook culvert replacement at Hale Hill Road, Swanzey, NH

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
		Contoocook Service Area
2013 **Green Crow** Stoddard	$461,326 $15,000 3%	**69** – Funds were used to permanently protect 361 acres through the purchase of a conservation easement on land recently purchased by the Harris Center for Conservation Education (HCCE) in Stoddard, NH. The property is predominantly mixed northern hardwoods (beech, birch, maple and ash) but turns to a soft-wood-dominated forest with hemlock and spruce in the eastern portion of the land. An old class VI road, King Street, was the old Monadnock-Sunapee trail prior to 1938 when the hurricane forced the rerouting of the trail farther west. The conservation easement will designate "forever wild/natural area" restrictions from forest management, agricultural or other intensive uses. Trail development, hunting and other passive public uses will be permitted. The westerly portion of the property will contain the typical easement terms, allowing for commercial forest management, agriculture and wildlife habitat management. This area has been the subject of a great deal of concerted conservation activity by the Harris Center, Forest Society and other groups. To the immediate south, the property abuts other land held in fee by HCCE. The properties provide substantial linkage to and enhance the size and ecological function of previously protected lands in Stoddard, Nelson and Hancock.
2015 **Brown Property** Sutton	$354,500 **$150,000** 42%	**70** – The Forest Society purchased and permanently protected the 236-acre Brown property in Sutton. The Brown tract directly abuts the Forest Society's 1,054-acre Black Mountain Forest, which was conserved in 2010. The Black Mountain Forest, in turn, abuts the 4,565-acre Mt. Kearsage State Forest and several other conservation parcels to create a block of over 9,000 acres of contiguous conservation land. One of the primary goals of this conservation project is the protection 2,100 feet of both sides of an un-named perennial stream which drains off the property through the existing Black Mountain Forest and finally into Stevens Brook, a tributary to the Warner River. NHFG's Inland Fisheries Division is in the process of completing a Fisheries Management Plan for the Lower Warner River Watershed to conserve and restore wild brook trout in the watershed. Through that effort, the stream on the Brown tract was identified as having the highest documented wild brook trout density of all the streams in the Lower Warner River watershed. The Brown parcel contains very high-quality wildlife habitat including 63 acres of Tier 1 (highest ranked habitat in the state), and 46 acres of Tier 2 (highest ranked habitat in the region) wildlife habitat, according to the WAP. The property contains at least three state-listed rare plants, provides easy public access to this property, and the adjacent Kearsarge Regional High School provides exceptional educational opportunities.
2016 **Azalea Park** Henniker	$41,690 **$24,000** 58%	**71** – The Town of Henniker was provided funds to install stormwater management structures to improve water quality and minimize stormwater erosion along the bank of the Contoocook River at Azalea Park. Azalea Park is a historical landmark in downtown Henniker, located along the State-designated Contoocook River. The focus of this phase of the project is to manage the upland stormwater runoff, which has been directed into a wetland in the park, causing erosion of the park entrance path and adding sediments and salt into the wetland. Managing the upland stormwater runoff and controlling the water flow into the river after storm events will help decrease the sediment washing into the river.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
		Middle Connecticut Service Area
2012 **Ammonoosuc Hanno Pond** Lisbon	$98,350 **$98,350** 100%	**72** – The Ammonoosuc Conservation Trust preserved nearly one mile of riparian buffer on the Ammonoosuc River. The project is located approximately 0.5-mile upstream of Lisbon Village and potentially includes portions of four parcels of land that include a complex of wetland and agricultural land surrounding Hanno Pond, a six-acre oxbow pond. The project area is located within the highest yielding and deepest aquifer in the Ammonoosuc River Valley. Nearly the entire site is within the floodplain of the Ammonoosuc River and most of it floods regularly. It is located upstream of municipal water sources at Lisbon and Woodsville, and the Lisbon community well lies directly across from the lower section of the project area. Restoration opportunities include bank stabilization, stream improvements and plantings.
2013 **Ammonoosuc Floodplain Restoration** Lisbon	$66,000 **$60,000** 91%	**73** – The Ammonoosuc Conservation Trust used funds to begin floodplain restoration and enhancement on the property acquired from a 2012 ARM Fund grant. The ACT's long-term goals are to restore and protect floodplain forest and restore/create riparian, wetland, and upland functions and values within a 1,600-square foot area. Additional goals are to buffer and enhance the Hanno Pond wetland complex and provide increased educational and recreational values. This proposal is to restore a four-acre hayfield to a riparian forested buffer and to plant the existing Ammonoosuc River bank with dormant stakes. Included in the project is a culvert removal and wetland restoration at the current agricultural crossing of the unnamed perennial brook that parallels Route 302.
2013 **Bailey-Clay Brook** Lyme	$278,000 **$60,000** 22%	**74** – This project protected 50 acres, including 4.8 acres of wetlands west of New Hampshire Route 10, 2,044 linear feet of a stream frontage and 45 acres of undeveloped upland. The Bailey-Clay Brook property is located both adjacent to and in close proximity with other permanently conserved lands and creates a protected corridor between these otherwise unconnected conserved lands. These highly diverse wetlands and the undeveloped corridor are important for wildlife movement and ecological integrity. Permanent protections will be accomplished through the acquisition of a conservation easement on the 50 acres, to be held by the Upper Valley Land Trust. This property includes 3,780 linear feet of frontage along Route 10, part of the Connecticut River National Scenic Byway, making it a highly visible landmark within the community.
2015 **Brebner Conservation Area** Bethlehem	$176,000 **$100,000** 57%	**75** – Ammonoosuc Conservation Trust conserved 203 acres of forest land, 4,327 linear feet of frontage on the Ammonoosuc River, a State-designated river, and over 7,500 linear feet of streams that drain across the site and into the Ammonoosuc. The property includes Black Brook and Barrett Brook, which are Order 1 and Order 2 streams, and a palustrine emergent/scrub shrub wetland with a history of beaver activity. Forested wetlands surround Barrett Brook with 0.75 miles along the Ammonoosuc River. This section of the river represents the beginning of the upper section of the Ammonoosuc River, which is extremely bouldery with rapids and is an excellent fresh water fishery. The site is located upstream from municipal water sources at Lisbon and Woodsville and nearly the entire area is within either the highest ranked habitat in the biological region (Tier 2) or supporting area (Tier 3).

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2016 **Shumway Forest** Hanover	$326,300 **$249,740** 76%	**76** – The Shumway Forest conservation project protects a total of 313 acres on Moose Mountain, including 23.5 acres of wetland and 10,900 linear feet of riparian corridor, through acquisition of a permanent conservation easement by the Hanover Conservancy. On the Shumway property, 45 of the 313 acres are already protected by federal easements. This project adds another 268 acres to the existing contiguous 2,353 acres of federal, local and private conservation lands north of Mill Pond, and 1,177 acres of local and private conservation lands on the south side of the pond. This would result in a total of nearly 3,800 acres on Moose Mountain that are either permanently protected or managed by Hanover's Conservation Commission strictly for conservation purposes. The property includes the presence of Tier 1 and Tier 2 wildlife habitat and supporting landscape, highest elevation unprotected wildlife habitat in the town, and the presence of recreational foot trails, including the Appalachian Trail. The wetland assessment identified at least ten types of valuable wetlands on this property, along with intermittent and perennial 1st, 2nd and 3rd order streams and their floodplains; pond and pond edge; shrub/moss fen; red spruce swamp; and probable vernal pools.
		Upper Connecticut Service Area
2010 **Potter Farm** Northumberland	$381,702 **$148,000** 39%	**77** – The ARM Funds were used to purchase a 326 acre property by The Nature Conservancy for protection and restoration of 11 acres of floodplain forests, maintain agricultural land uses, and protect uplands and rivershore connectivity. The project is an entire ridgeline-to-rivershore swath. This parcel is part of TNC's "Kilkenny Matrix Forest Block", comprising 119,600 acres of unfragmented forest.
2015 **Nash Stream Trout Restoration** Odell and Strafford	$245,000 **$5,000** 2%	**78** – Trout Unlimited completed aquatic restoration work in Nash Stream to improve habitat quality and connectivity to support watershed management goals, including native coldwater fish habitat. In this final phase, Trout Unlimited will restore over two miles of instream and riparian habitat that was damaged by a catastrophic dam break and subsequent channel alteration, and complete up to 13,580 linear feet (2.6 miles) of tributary wood replenishment in the East Branch.
2016 **Upper Connecticut Floodplain Project** Colebrook	$347,838 **$79,800** 34%	**79** – The Nature Conservancy used funds to protect and restore 71.6 acres of high conservation-value riverine habitat, floodplain forest and farmland along 1.6 miles of the Connecticut River. The project will result in the permanent protection of 3.4 contiguous miles of Connecticut River shoreline on the New Hampshire side. The protection of the Brunault property will contribute to a 970-acre block of protected conservation land on both sides of the river. Restoration of the parcel's floodplains will create a more resilient ecosystem, ensuring dynamic river processes, such as channel migration that creates oxbows and sandbars for pioneer species recruitment. It will also help ensure the protection of four state-listed endangered plants found on the property. The floodplain forest on the Brunault tract is also part of a rare natural community.

Award year **Project Name** Town	Total Cost **ARM Award** % total	Project Summary Bolded numbers denote project boundaries on corresponding maps for each service area
2016 **Nash Stream Restoration Phase II** Odell and Strafford	$43,930 **$15,000** 34%	**80** – Trout Unlimited (TU), in partnership with NHFG and the New Hampshire Division of Forest and Lands, completed aquatic restoration work in the Nash Stream watershed. The Nash Stream Restoration Project is a phased, multi-year effort to restore channel processes and habitat quality/connectivity so that the watershed supports an intact aquatic ecosystem. In this second phase of tributary wood replenishment, TU added wood to the channel and restored up to 3.2 miles of instream and riparian habitat that was impaired by historic logging activities. ARM funds supported wood replenishment in the East Branch and Long Mountain Brook, which are direct tributaries to Nash Stream. The project restored nine miles of main stem and ten miles of tributary habitat, and reconnect over six miles of tributaries. The Nash Stream Restoration Project is located entirely within the publicly-owned Nash Stream Forest, which prioritizes permanent protection of the restored aquatic resources that provide lasting public benefit.

Potter Farm floodplain protection and restoration Northumberland, NH