



**Public Service
of New Hampshire**

A Northeast Utilities Company

AR-1308

PSNH Energy Park
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June 18, 2013

D32304

U.S. Environmental Protection Agency
Region 1: New England
Office of Ecosystem Protection
Water Technical Unit (OES04 – SMR)
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Dear Sir/Madam:

Merrimack Station
NPDES Permit No. NH0001465
2012 Annual Fish Impingement Report

Public Service of New Hampshire (PSNH) submits this Annual Fish Impingement Report for the year 2012 pursuant to Part I., Section A.10.b of the Merrimack Station NPDES Permit, No. NH0001465. This permit condition requires PSNH to conduct impingement monitoring at Merrimack Station according to the provisions below.

- PSNH shall provide impingement monitoring at Merrimack Station when flows from Garvins Falls Hydroelectric Station are less than 900 cfs during any period from July 1 through October 15.
- PSNH shall collect all fish from both MK-1 and MK-2 traveling screen washes during one continuous 48-hour period per week when the conditions outlined above are met.
- PSNH shall report in writing to the New Hampshire Fish & Game Department (NHFGD), United States Fish and Wildlife Service (USFWS), New Hampshire Department of Environmental Services (NHDES) and the United States Environmental Protection Agency (USEPA) any Extraordinary Impingement Event (EIE) at Merrimack Station. An EIE is defined as an event when 50 or more fish at any one time, of any size or species, are either distressed or killed as a result of impingement.

Based on river flows at Garvins Falls Hydro and unit operation, Merrimack Station was required to collect five weekly samples from the intake screens between July 1 and October 15. A total of thirty-one identifiable fish were collected over the entire sampling season, along with another nine samples of fish parts that were heavily decomposed and

unidentifiable. Impingement rates for the sampling periods were calculated by dividing the total number of fish collected by the total volume of water passed through the units. The volume of water reported is based on circulating pump capacities and the number of pumps that were operating during each screen wash cycle. Each operating unit has two pumps; the pumps servicing Unit 1 are rated at 63 cfs each (126 cfs total), the pumps servicing Unit 2 are rated at 144.5 cfs each (289 cfs total).

Table 1 summarizes the total number of fish collected and the impingement rate for each sampling period. The average impingement rate for 2012 was 0.09 fish per million cubic feet of screened water. As demonstrated every year, the rate of fish impingement at Merrimack Station is extremely low by all industry standards even though the data is collected during worse case conditions, i.e., when river flows are less than 900 cfs. Table 2 identifies the thirty-one impinged fish by common name as well as the respective total lengths. Table 3 provides corresponding scientific names of the fish species commonly found in this section of the Merrimack River. There were no extraordinary impingement events during the 2012 monitoring period.

Should you have any questions regarding this program, please contact Allan Palmer at (603) 634-2439.

Very truly yours,



Elizabeth H. Tillotson
Technical Business Manager

cc: Ms. Sharon M. DeMeo
US Environmental Protection Agency
Region 1: New England
Office of Ecosystem Protection
Mail Code: OEP06-4
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Mr. Eric Nelson
US Environmental Protection Agency
Region 1: New England
Office of Ecosystem Protection
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5 Post Office Square - Suite 100
Boston, MA 02109-3912

NH Department of Environmental Services
Water Division.
Wastewater Engineering Bureau
Permits and Compliance Section
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Mr. Joseph F. McKeon
US Fish and Wildlife Service
Central New England Fishery Resources Office
151 Broad Street
Nashua, NH 03063

Mr. John Magee
New Hampshire Fish and Game Department
Inland Fisheries Division
11 Hazen Drive
Concord, NH 03301

TABLE 1

Merrimack Station
 Fish Impingement Monitoring Program
2012 Schedule & Impingement Rates

48 Hour Sample Dates	Unit(s) Sampled	48 Hour Flow Through the Units	Impingement Rate	Fish Count
07/12 - 07/14	1&2	71,712,000 cu. ft.	0.08/million cu. ft.	6
07/15 - 07/17	1&2	71,712,000 cu. ft.	0.01/million cu. ft.	1
07/22 - 07/24	1&2	71,712,000 cu. ft.	0.29/million cu. ft.	21
07/29 - 07/31	1&2	71,712,000 cu. ft.	0	0
08/05 - 08/07	1&2	60,825,600 cu. ft.	0.05/million cu. ft.	3

The average impingement rate for the five sampling periods was 0.09 fish per million cubic feet of screened water.

TABLE 2

Merrimack Station
 Fish Species Collected During Impingement Monitoring
July 1, 2012 through October 15, 2012

<u>Sampling Period</u>	<u>Fish Species Collected</u>	<u>Total Length (cm)</u>
07/12 - 07/14	Bluegill Sunfish	12
	Brown Bullhead	41
	White Sucker	20
	White Sucker	10
	White Sucker	10
	White Sucker	25
07/15 - 07/17	Brown Bullhead	20
07/22 - 07/24	Alewife	5
	Smallmouth Bass	18
	Smallmouth Bass	16
	Smallmouth Bass	12
	Smallmouth Bass	19
	Smallmouth Bass	13
	Smallmouth Bass	8
	Smallmouth Bass	22
	Smallmouth Bass	19
	Smallmouth Bass	20
	Bluegill Sunfish	14
	Redbreast Sunfish	23
	Redbreast Sunfish	17
	Redbreast Sunfish	14
Redbreast Sunfish	8	

<u>Sampling Period</u>	<u>Fish Species Collected</u>	<u>Total Length (cm)</u>
	Redbreast Sunfish	6
	Brown Bullhead	20
	White Sucker	44
	White Sucker	43
	White Sucker	42
	White Sucker	20*
08/05 – 08/07	Smallmouth Bass	10
	Smallmouth Bass	13
	Redbreast Sunfish	16

* Decomposed Sample

TABLE 3

Merrimack Station
Scientific Names of Species
Common in the Merrimack River

Smallmouth Bass	<i>Micropterus dolomieu</i>
Largemouth Bass	<i>Micropterus salmoides</i>
Bluegill Sunfish	<i>Lepomis macrochirus</i>
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>
Redbreast Sunfish	<i>Lepomis auritus</i>
Brown Bullhead	<i>Ictalurus nebulosus</i>
White Sucker	<i>Catostomus commersoni</i>
Yellow Perch	<i>Perca flavescens</i>
Common Shiner	<i>Notropis cornutus</i>
Spottail Shiner	<i>Notropis hudsonius</i>
Alewife	<i>Alosa pseudoharengus</i>
Chain Pickerel	<i>Esox niger</i>
Northern Pike	<i>Esox lucius</i>
Creek Chub	<i>Semotilus atromaculatus</i>
Common Carp	<i>Cyprinus carpio</i>
American Eel	<i>Anguilla rostrata</i>



**Public Service of
New Hampshire**

**MERRIMACK STATION
FISH IMPINGEMENT MONITORING
REPORT**

**JULY 1 TO OCTOBER 15
2012**

ENVIRONMENTAL DATA

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7-7-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	ON
MK-2	OFF

CIRC PUMP STATUS

MK-1	A+B
MK-2	—

*River flow above 900 cfs.

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7-14-12

SAMPLING PERIOD
Begin 7-12-12
End 7-14-12

UNIT STATUS
MK-1 ON
MK-2 ON

CIRC PUMP STATUS
MK-1 A+B
MK-2 A+B

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish	12																			
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead	41																			
White Sucker	20	10	10	25																
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Decomposed? Broken	10"	7"	7"	9"	4"	5"														
Additional Fish																				

VKH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7-21-12

SAMPLING PERIOD
Begin 7-15-12
End 7-17-12

UNIT STATUS
MK-1 ON
MK-2 ON

CIRC PUMP STATUS
MK-1 A+B
MK-2 A+B

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead	20																			
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Decomposed - Broken	4~	6~																		
Additional Fish																				

**FISH IMPINGEMENT MONITORING
WEEKLY DATA SHEET
MERRIMACK STATION**

Week Ending 7-28-12

SAMPLING PERIOD
Begin 7-22-12
End 7-24-12

UNIT STATUS
MK-1 ON
MK-2 ON

CIRC PUMP STATUS
MK-1 A&B
MK-2 A&B

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife	5																			
American Shad																				
Small mouth Bass	18	16	12	19	13	8	22	19	20											
Largemouth Bass																				
Bluegill Sunfish	14																			
Pumpkinseed Sunfish																				
Redbreasted Sunfish	23	17	14	8	6															
Brown Bullhead	20																			
White Sucker	44	43	42	20*																
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

* Decomposed.

VLLK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8-4-12

SAMPLING PERIOD
Begin 7-29-12
End 7-31-12

UNIT STATUS
MK-1 ON
MK-2 ON

CIRC PUMP STATUS
MK-1 A+B
MK-2 A+B

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Decomposed / Broken	<u>8</u>																			
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8-11-12

SAMPLING PERIOD
 Begin 8-5-12
 End 8-7-12

UNIT STATUS
 MK-1 ON
 MK-2 ON

CIRC PUMP STATUS
 MK-1 A
 MK-2 A&B

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass	10	13																		
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish	16																			
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VKK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8-18-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	—
MK-2	—

* River flow above 900 cfs.

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8-25-12

SAMPLING PERIOD

Begin	/
End	

UNIT STATUS

MK-1	ON
MK-2	ON

CIRC PUMP STATUS

MK-1	A+B
MK-2	A+B

* River flow above 900cfs.

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9-1-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	—
MK-2	—

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

✓KHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9-08-12

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VKLK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9-15-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	-
MK-2	-

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9-22-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	-
MK-2	-

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
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Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9-29-12

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VKLK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10-6-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	—
MK-2	—

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10-13-12

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

✓KJK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10-15-12

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	0
MK-2	1

Species	Total length (TL) of up to 20 fish per species measured to the nearest centimeter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				