



431 River Road
Bow, NH 03304

GSP MERRIMACK

December 19, 2018

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
2017 Annual Fish Impingement Report

Granite Shore Power LLC (GSP) herein submits this Annual Fish Impingement Report for the year 2017 pursuant to Part I., Section A.10.b. of the Merrimack Station NPDES Permit, No. NH0001465. This permit condition requires GSP to conduct impingement monitoring at Merrimack Station according to the provisions below.

- GSP shall provide impingement monitoring at Merrimack Station when flows from Garvins Falls Hydroelectric Station are less than 900 cubic feet per second (cfs) during any period from July 1 through October 15.
- GSP 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.
- GSP 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.

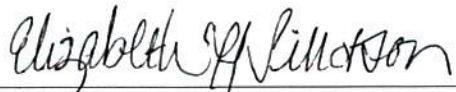
Based on river flows at Garvins Falls Hydro and unit operation, Merrimack Station was required to collect three weekly samples from the intake screens between July 1 and October 15 in 2017. A total of six fish were collected during normal impingement monitoring over the entire sampling season. Impingement 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 2017 was 0.18 fish per million cubic feet of screened water. As demonstrated each 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 six 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. All of the weekly data sheets are attached to demonstrate river flows above 900 cfs and the operational status of the two units. There were no extraordinary impingement events in 2017.

If you have any questions regarding this report, please call Allan Palmer at (603) 230-7951.

Sincerely,

GRANITE SHORE POWER

A handwritten signature in cursive script that reads "Elizabeth H. Tillotson". The signature is written in black ink and is positioned above a horizontal line.

Elizabeth H. Tillotson
Executive Director of Administration & Regulatory Affairs

Enclosures

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

Mr. Eric Nelson
US Environmental Protection Agency
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5 Post Office Square - Suite 100
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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, Fish Habitat Biologist
New Hampshire Fish and Game Department
Inland Fisheries Division
11 Hazen Drive
Concord, NH 03301

Ms. Carol Henderson, Environmental Review Coordinator
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, NH 03301

TABLE 1

Merrimack Station
Fish Impingement Monitoring Program
2017 Schedule and Impingement Rates

<u>48 Hour Sample Dates</u>	<u>Unit(s) Sampled</u>	<u>48 Hour Flow Through the Units</u>	<u>Impingement Rate</u>	<u>Fish Count</u>
08/02 - 08/04	1	10,886,400 cu. ft.	0.28/million cu. ft.	3
08/15 - 08/17	1	10,886,400 cu. ft.	0.09/million cu. ft.	1
08/29 - 08/31	1	10,886,400 cu. ft.	0.18/million cu. ft.	2

The average impingement rate for the two sampling periods was 0.18 fish per million cubic feet of screened water.

TABLE 2

Merrimack Station

Fish Species Collected During Impingement Monitoring

July 1, 2017 through October 15, 2017

<u>Sampling Period</u>	<u>Fish Species Collected</u>	<u>Total Length (cm)</u>
08/02 – 08/04	Yellow Perch	15
	Yellow Perch	10
	Yellow Perch	27
08/15 – 08/17	Smallmouth Bass	17
08/29 – 08/31	Yellow Perch	19
	Yellow Perch	15

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>

1/11/17



Public Service of
New Hampshire

**MERRIMACK STATION
FISH IMPINGEMENT MONITORING
REPORT**

JULY 1 TO OCTOBER 15

2017

ENVIRONMENTAL DATA

VTH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/1/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

Species	Date (MM/DD/YYYY) Time (HH:MM)																			
	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 7/8/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	A
MK-2	OFF

River flow above 900cfs

Species	Total length (in) of up to 20 fish per species (measured to the nearest millimeter)																			
	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																				

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/15/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	ON
MK-2	OFF

CIRC PUMP STATUS

MK-1	A+B
MK-2	A

* River flow above 900 cfs

Species	Date																			
	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																				

✓/HH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/22/17

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 900 cfs.

Species	Number of Fish per Species (by date)																			
	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 7/29/17

SAMPLING PERIOD

Begin	/
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	A
MK-2	OFF

*River flow above 900 cfs

Species	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																				

FISH IMPINGEMENT MONITORING
WEEKLY DATA SHEET
MERRIMACK STATION

Week Ending 8/5/17

SAMPLING PERIOD	
Begin	8/2/17
End	8/4/17

UNIT STATUS	
MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS	
MK-1	A
MK-2	OFF

Species	Date																			
	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	15	10	27																	
Common Shiner																				
Spottail Shiner																				
American eel																				
Undetermined Species																				
Additional Fish																				

✓AK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8/12/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	A
MK-2	OFF

* River flow above 900cfs

	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																				

✓HLK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8/19/17

SAMPLING PERIOD

Begin	8/15/17
End	8/17/17

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

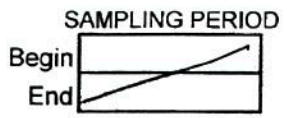
MK-1	A
MK-2	OFF

Species	Date																			
	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	17																			
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Undetermined species																				
Additional Fish																				

VKH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8/26/17



UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	A
MK-2	OFF

* River flow above 900 cfs.

	1	2	3	4	5	6	7	8	9	10	11	12
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												
Unknown												

VHH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/2/17

SAMPLING PERIOD
 Begin 8/29/17
 End 8/31/17

UNIT STATUS
 MK-1 OFF
 MK-2 OFF

CIRC PUMP STATUS
 MK-1 A
 MK-2 OFF

	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	19	15																		
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

VHK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/9/17

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

Species	The following table is intended to be used to record the number of fish impinged in each of the 20 traps during the sampling period.																			
	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																				

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/16/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

	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																				

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/23/17

SAMPLING PERIOD

Begin	/
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

Species	Date													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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														

VAK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/30/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10
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																	
Undetermined species																	
Additional Fish																	

4/4/17

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10/7/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

	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																				
Undetermined Species																				
Additional Fish																				

✓KHH

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 6/14/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

	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																				
Undetermined Species																				
Additional Fish																				

JKK

FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10/21/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

Species	Date																			
	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																				