Monthly Pile Driving Summary
Underwater Noise Monitoring Results

Pile Driving Period: February 18, 2014 - March 17, 2014
Revised May 2, 2014 to include 21 trestle piles driven this period
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Summary:
No sturgeon were observed to have been severely injured or killed as a result of underwater noise from pile driving during this reporting period. This conclusion was reached based on the results of sturgeon monitoring by observers on the barge and on a monitoring vessel downstream of the piles being driven.

Recoverable injuries caused by exposure to sub-lethal levels of underwater noise could not have been sustained by more than one sturgeon during this reporting period. This conclusion was reached by considering:

- the time required to drive each pile;
- the underwater area that experienced noise levels higher than the level that could potentially result in recoverable injury to the sturgeon (206 dB re 1 µPa peak sound pressure level); and
- the possible number of sturgeon that could have been in that area (number of gill nets x sturgeon encounter rate).

The potential number of sturgeon likely to have experienced recoverable injuries (described as "sturgeon take") is reported as the probability of a fish being affected by exposure to underwater noise from pile driving, as shown in the table below. If the sturgeon take is listed as 1, then 1 sturgeon was potentially exposed to recoverable noise levels. If sturgeon take is less than 1, then it is less likely that 1 sturgeon was affected. As shown at the bottom right of the table below, the cumulative sturgeon take was 0.26 sturgeon (that is, less than 1 sturgeon) for this reporting period, which is less than the 2.21 sturgeon that was anticipated based on the NMFS Biological Opinion (NMFS BO).

Introduction:
As required under the NMFS BO, dated April 2013, Reasonable & Prudent Measure #4 and Term & Condition #9, the following is a summary of the installation and underwater noise monitoring of permanent piles, [redacted] for the time period beginning February 18, 2014 through March 17, 2014.

As required under this condition, an estimate of sturgeon take for production piles driven during the most recent 30-day monitoring period is included. The sturgeon take estimate has been calculated using the times required to drive each pile (impact hammer only) and an estimate of the diameter of the 206 dB peak SPL isopleth. Because there were no underwater noise measurements made during this reporting period, the size of the isopleth was conservatively assumed to be equivalent to the maximum isopleth measured to date for [redacted] (i.e., 19 feet for test pile PLT-113) and [redacted] production piles at Pier 31 and 32 (i.e., 200 feet and 60 feet

respectively). This take estimate has been compared to that listed for the same piles in Table 9 of the NMFS BO to ensure that sturgeon take is not being exceeded.

Pile Installation and Underwater Noise Monitoring:
During the 30-day period from February 18 through March 17, 2014, production piles and trestle piles were driven. Of these, piles were driven at (each at the eastbound and westbound piers), piles were driven at and piles were driven at the Rockland trestle and piles were driven at the Westchester trestle. The at correspond to the piles driven in weeks 13 to 24 and the piles driven during weeks 24 to 27 of 2014 in Table 9. The anticipated incidental take for the first group of piles is 1 sturgeon for piles; the anticipated take for the second group is 2 sturgeon for piles. The second group also includes trestle piles scheduled for weeks 44 and 45 of 2013. The at correspond to the first two rows of 2013 in Table 9 of the NMFS BO, which indicates that piles will be driven at at during the first few weeks of production pile driving; piles in this group remain to be driven. In Table 9, the anticipated incidental take of sturgeon for these 100 piles is 6 sturgeon (rounded up from 5.28 sturgeon), which was calculated as the product of the number of piles, number of hours to drive a pile, number of gill nets to span the 206 dB peak SPL isopleth, and the sturgeon encounter rate of 0.033 sturgeon per net per hour.

To calculate anticipated sturgeon take per pile from Table 9, the anticipated take of 6 sturgeon for piles at was divided by the piles in this grouping, which resulted in an estimate of 0.06 sturgeon per pile. Similarly, the anticipated take of 1 sturgeon for piles at the first group at westbound was divided by the piles for this group and 2 sturgeon for piles at eastbound was divided by the piles for that group, which resulted in an estimate of 0.05 sturgeon per pile for westbound and 0.02 sturgeon per pile for eastbound. Based on these values:

- the anticipated take from Table 9 for the piles driven from February 18 through March 17 would be 2.21 sturgeon (i.e., the sum of 0.06 sturgeon per pile multiplied by piles, 0.05 sturgeon multiplied by 11 piles, and 0.02 sturgeon multiplied by piles),
- the cumulative take associated with the 98 production and trestle piles driven to date (as anticipated in Table 9 of the NMFS BO) is the sum of the anticipated take values for all 98 piles, or 4.31 sturgeon.

Following the same method used to estimate incidental sturgeon take for Table 9, the product of pile driving time, number of gill nets to span the width of the 206 dB isopleth, and sturgeon encounter rate of 0.033 sturgeon per net per hour was used to calculate sturgeon take for the production piles driven during this reporting period. For previous piles that have been monitored for underwater noise, the diameter of the 206 dB peak SPL isopleth was measured based on the maximum peak SPL recorded during pile driving. For the unmonitored piles, the maximum recorded isopleth diameter was assigned based on noise monitoring from the test pile program or from noise monitoring of production piles at each pier. Actual pile driving times for each of the piles were used in the calculations.

During this reporting period, none of the production piles exceeded the maximum allowable pile driving times of 0.5 hours for [redacted] piles and 1.0 hour per pile for [redacted] piles. With the exception of [redacted] trestle piles that exceeded 0.17 hours per pile (0.18 to 0.23 hours), none of the trestle piles exceeded the anticipated pile-driving times. Although there was no underwater noise monitoring for the piles driven during this reporting period, the size of the 206 dB peak SPL isopleths for piles measured previously have not exceeded the maximum diameters for piles listed in Table 9 of the NMFS BO. Therefore, it is assumed that the maximum allowable isopleth width was not exceeded during this reporting period.

Based on the recorded pile-driving times and isopleth widths:

- the incidental sturgeon take for the [redacted] piles driven during the 30-day period from February 18 through March 17 was calculated as 0.26 sturgeon, which is less than the estimate of 2.21 sturgeon for the same [redacted] piles listed in Table 9,
- the cumulative incidental take for the [redacted] production piles driven to date was calculated as 0.97 sturgeon, which is less than the anticipated take of 4.37 sturgeon for the same [redacted] piles in Table 9.

Therefore, incidental take for sturgeon was not exceeded during the most recent 30-day reporting period for production pile driving, nor has the cumulative sturgeon take been exceeded for all production piles driven to date. The monthly sturgeon take estimated for this reporting period was lower than anticipated because of the shorter than expected drive times for piles driven during this time period (i.e., less than 0.4 hours per pile for [redacted] piles vs. 0.5 hours per pile as anticipated in the NMFS BO; less than 0.5 hours per pile for most of the [redacted] piles vs. 1.00 hours per pile as anticipated in the NMFS BO).

Report Period: 02/18/2014 to 03/17/2014

Date	Year	Week	[redacted]	Net Impact Pile Driving Duration (hrs/pile)	Pile Driving Time from Table 9 of the NMFS BO (hrs/pile)	Average width of isopleth for 206-dB peak SPL (feet)	Maximum width of isopleth for 206-dB peak SPL (feet)	Number of gill nets to span the 206-dB peak SPL isopleth	Sturgeon encounter rate (fish/net/ hour)	Sturgeon take
2/19/2014	2014	8		0.47	1.00	Not measured	200	1.6	0.033	0.025
2/19/2014	2014	8		0.42	1.00	Not measured	200	1.6	0.033	0.022
2/20/2014	2014	8		0.70	1.00	Not measured	200	1.6	0.033	0.037
2/21/2014	2014	8		0.05	0.5	Not measured	19	0.2	0.033	0.000
2/21/2014	2014	8		0.07	0.5	Not measured	19	0.2	0.033	0.000
2/21/2014	2014	8		0.07	0.5	Not measured	19	0.2	0.033	0.000
2/21/2014	2014	8		0.05	0.5	Not measured	19	0.2	0.033	0.000
2/21/2014	2014	8		0.05	0.5	Not measured	19	0.2	0.033	0.000
2/24/2014	2014	9		0.02	1.00	Not measured	200	1.6	0.033	0.001
2/24/2014	2014	9		0.55	1.00	Not measured	200	1.6	0.033	0.029
2/24/2014	2014	9		0.42	1.00	Not measured	200	1.6	0.033	0.022
2/26/2014	2014	9		0.18	0.17	Not measured	32	0.3	0.033	0.002
2/26/2014	2014	9		0.23	0.17	Not measured	32	0.3	0.033	0.002
2/27/2014	2014	9		0.08	0.5	Not measured	19	0.2	0.033	0.000
2/27/2014	2014	9		0.10	0.5	Not measured	19	0.2	0.033	0.001
2/27/2014	2014	9		0.05	0.5	Not measured	19	0.2	0.033	0.000
2/27/2014	2014	9		0.08	0.5	Not measured	19	0.2	0.033	0.000
2/27/2014	2014	9		0.07	0.5	Not measured	19	0.2	0.033	0.000
2/27/2014	2014	9		0.05	0.5	Not measured	19	0.2	0.033	0.000
2/27/2014	2014	9		0.13	0.08	Not measured	76	0.6	0.033	0.003
2/27/2014	2014	9		0.12	0.08	Not measured	76	0.6	0.033	0.002
2/27/2014	2014	9		0.08	0.08	Not measured	76	0.6	0.033	0.002
2/27/2014	2014	9		0.08	0.08	Not measured	76	0.6	0.033	0.002
3/1/2014	2014	9		0.38	1.00	Not measured	200	1.6	0.033	0.020
3/1/2014	2014	9		0.20	1.00	Not measured	200	1.6	0.033	0.011
3/1/2014	2014	9		0.53	1.00	Not measured	200	1.6	0.033	0.028
3/6/2014	2014	10		0.13	0.17	Not measured	32	0.3	0.033	0.001
3/6/2014	2014	10		0.03	0.17	Not measured	32	0.3	0.033	0.000
3/7/2014	2014	10		0.12	0.5	Not measured	19	0.2	0.033	0.001
3/7/2014	2014	10		0.13	0.5	Not measured	19	0.2	0.033	0.001
3/7/2014	2014	10		0.23	0.5	Not measured	19	0.2	0.033	0.001

Date	Year	Week		Net Impact Pile Driving Duration (hrs/pile)	Pile Driving Time from Table 9 of the NMFS BO (hrs/pile)	Average width of isopleth for 206-dB peak SPL (feet)	Maximum width of isopleth for 206-dB peak SPL (feet)	Number of gill nets to span the 206-dB peak SPL isopleth	Sturgeon encounter rate (fish/net/ hour)	Sturgeon take
3/7/2014	2014	10		0.17	0.5	Not measured	19	0.2	0.033	0.001
3/7/2014	2014	10		0.25	0.5	Not measured	19	0.2	0.033	0.001
3/10/2014	2014	11		0.27	1.00	Not measured	60	0.5	0.033	0.004
3/10/2014	2014	11		0.23	1.00	Not measured	60	0.5	0.033	0.004
3/10/2014	2014	11		0.28	1.00	Not measured	60	0.5	0.033	0.004
3/10/2014	2014	11		0.28	1.00	Not measured	60	0.5	0.033	0.004
3/10/2014	2014	11		0.05	0.08	Not measured	76	0.6	0.033	0.001
3/10/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/10/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/10/2014	2014	11		0.08	0.08	Not measured	76	0.6	0.033	0.002
3/11/2014	2014	11		0.28	1.00	Not measured	60	0.5	0.033	0.004
3/11/2014	2014	11		0.23	1.00	Not measured	60	0.5	0.033	0.003
3/11/2014	2014	11		0.22	1.00	Not measured	60	0.5	0.033	0.004
3/12/2014	2014	11		0.23	0.5	Not measured	19	0.2	0.033	0.001
3/12/2014	2014	11		0.27	0.5	Not measured	19	0.2	0.033	0.002
3/12/2014	2014	11		0.40	0.5	Not measured	19	0.2	0.033	0.001
3/12/2014	2014	11		0.12	0.5	Not measured	19	0.2	0.033	0.001
3/12/2014	2014	11		0.23	0.5	Not measured	19	0.2	0.033	0.001
3/12/2014	2014	11		0.15	0.5	Not measured	19	0.2	0.033	0.001
3/12/2014	2014	11		0.20	0.5	Not measured	19	0.2	0.033	0.001
3/14/2014	2014	11		0.03	0.08	Not measured	76	0.6	0.033	0.001
3/14/2014	2014	11		0.03	0.08	Not measured	76	0.6	0.033	0.001
3/14/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/14/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/14/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/14/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/14/2014	2014	11		0.08	0.08	Not measured	76	0.6	0.033	0.002
3/14/2014	2014	11		0.02	0.08	Not measured	76	0.6	0.033	0.000
3/14/2014	2014	11		0.30	0.17	Not measured	32	0.3	0.033	0.003
3/17/2014	2014	12		0.32	0.17	Not measured	32	0.3	0.033	0.003
3/17/2014	2014	12		0.08	0.17	Not measured	32	0.3	0.033	0.001
3/17/2014	2014	12		0.05	0.17	Not measured	32	0.3	0.033	0.000

Monthly sturgeon take (Calculated based on pile-driving data/Anticipated from Table 9 of the April 2013 NMFS BO)	**0.26/2.21**
Cumulative sturgeon take to date (Calculated based on pile-driving data/Anticipated from Table 9 of the April 2013 NMFS BO)	**0.97/4.37**