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Fred Dacimo  
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NL-15-029

April 6, 2015

U.S. Nuclear Regulatory Commission  
Document Control Desk  
11545 Rockville Pike, TWFN-2 F1  
Rockville, MD 20852-2738

**SUBJECT:** Reply to Request for Additional Information Regarding the License  
Renewal Application Environmental Review (TAC Nos. MD5411 and  
MD5412)  
Indian Point Nuclear Generating Unit Nos. 2 & 3  
Docket Nos. 50-247 and 50-286  
License Nos. DPR-26 and DPR-64

**REFERENCE:** NRC letter, "Request for Additional Information for the Review of the  
Indian Point Nuclear Generating Unit Nos. 2 and 3, License Renewal  
Application Environmental Review (TAC Nos. MD5411 and MD5412)"  
dated February 18, 2015.

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. is providing, in the Attachment, the additional information requested in the referenced letter pertaining to NRC review of the License Renewal Application for Indian Point 2 and Indian Point 3. Also enclosed is a compact disk which contains electronic copies of the Hudson River Year Class Reports for years 2006 through 2011 that were requested in RAI 2 and various data files that are discussed in the responses for RAIs 1, 3, 4, and 5.

There are no new commitments being made in this submittal. If you have any questions, or require additional information, please contact Mr. Robert Walpole, Regulatory Assurance Manager at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 6, 2015.

Sincerely,

A handwritten signature in black ink, appearing to be "FD", with a long horizontal flourish extending to the right.

FRD/rl

A128  
NR

Attachment: Reply to NRC Request for Additional Information Regarding the License Renewal Application Environmental Review

Enclosure: Compact Disk Media, Prepared by ASA Analysis & Communication, Inc., April 2015

cc: Mr. Daniel H. Dorman, Regional Administrator, NRC Region I (w/o Enc.)  
Mr. Sherwin E. Turk, NRC Office of General Counsel, Special Counsel (w/o Enc.)  
Mr. Michael Wentzel, NRC Project Manager, Division of License Renewal (w/o Enc.)  
Ms. Kimberly Green, NRC Project Manager, Division of License Renewal (w/o Enc.)  
Dr. Dennis Logan, NRC Aquatic Biologist, Division of License Renewal (w/Enc.)  
Mr. Douglas Pickett, NRR Senior Project Manager (w/o Enc.)  
Ms. Bridget Frymire, New York State Department of Public Service (w/o Enc.)  
Mr. John B. Rhodes, President and CEO NYSERDA (w/o Enc.)  
NRC Resident Inspector's Office (w/o Enc.)

**ATTACHMENT TO NL-15-029**

**REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION  
REGARDING THE  
LICENSE RENEWAL APPLICATION  
ENVIRONMENTAL REVIEW**

**ENTERGY NUCLEAR OPERATIONS, INC.  
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 & 3  
DOCKET NOS. 50-247 AND 50-286**

April 1, 2015

Ms. Dara Gray  
Entergy Nuclear Operations, Inc.  
Indian Point Energy Center  
450 Broadway, GSB  
P.O. Box 249  
Buchanan, NY 10511-0249

**Re: Nuclear Regulatory Commission Request for Additional Information for the Review of the Indian Point Nuclear Generating Unit Nos. 2 and 3, License Renewal Application Environmental Review (TAC Nos. MD5411 and MD5412) dated February 18, 2015 (“RAI”)**

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Dear Ms. Gray:

Enclosed is the response to the above-referenced RAI (the “RAI Response”) prepared by Drs. Douglas Heimbuch of AKRF, Inc., John Young of ASA Analysis & Communications, Inc., Mark Mattson of Normandeau Associates, Inc., and Lawrence Barnthouse of LWB Environmental Services, Inc. (collectively, the “Biological Team”). The RAI Response also includes a compact disc of the data and other information requested in the RAI.

In the RAI, NRC Staff primarily asks clarifying questions regarding apparent differences in information submitted to Nuclear Regulatory Commission (“NRC”) Staff in 2008 and 2014 in response to previously-issued RAIs. As the Biological Team explains in the RAI Response, the vast majority of the differences between the information provided in 2008 and 2014 are not data or programming errors. Instead, they arise from differences in the way the historical datasets were constructed, the choice of variables used in the 2008 and 2014 submissions, and the criteria used to exclude certain data potentially unreliable for the purpose at hand. In short, these differences have no impact on the integrity of either submission.

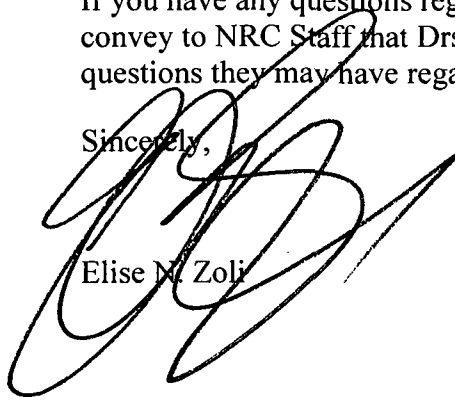
The Biological Team did identify a limited number of actual errors in the “Format 2” count files – specifically, fifty-nine (59) errors in the more than 265,000 discrete lines of data in the “Format 2” count files. This corresponds to an error rate of 0.02% which, for comparison purposes, is orders of magnitude below the maximum allowable error rate in the QA/QC program for the Hudson River Biological Monitoring Program data files. The Biological Team concludes in the RAI Response that these errors are insignificant on a technical or scientific basis and do not alter the conclusions to be derived from the 2014 submission or in the Final Supplemental Environmental Impact Statement (“FSEIS”) regarding the

Ms. Dara Gray  
April 1, 2015  
Page 2

potential adverse impact to individual species in the Hudson River associated with the renewal of the NRC operating licenses for Units 2 and 3.

If you have any questions regarding the RAI Response, please do not hesitate to contact me. Please also convey to NRC Staff that Drs. Heimbuch, Young, Mattson and Barnthouse are available to address any questions they may have regarding the RAI Response.

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read 'Elise M. Zoli', is written over the word 'Sincerely,'.

Elise M. Zoli

Enclosures

RESPONSES TO NUCLEAR REGULATORY COMMISSION STAFF'S  
REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE INDIAN  
POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3 LICENSE RENEWAL  
APPLICATION ENVIRONMENTAL REVIEW (TAC NOS. MD5411 AND MD5412)

Prepared by:

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April 2015

This document has been prepared to respond to the Nuclear Regulatory Commission (“NRC”) Staff’s Request for Additional Information for the Review of the Indian Point Nuclear Generating Unit Nos. 2 and 3, License Renewal Application Environmental Review (TAC Nos. MD5411 and MD5412) dated February 18, 2015 (the “Current RAI”). The Current RAI consists of five separate requests, which are repeated below, with our response immediately following each request. The focus of the Current RAI is on comparing datasets prepared during different time periods, with different contents, developed using different methodologies, over a period of almost a decade, *i.e.*, from 2007 to 2014, in response to previous Requests for Additional Information (“RAIs”) from NRC Staff. We address below how the various datasets, with minor exceptions that in no way affect conclusions, are consistent and comparable.

To ground the discussion of the various datasets referenced in the Current RAI, a brief summary of the nature and content of those datasets is useful. On behalf of Entergy Nuclear Operations, Inc. (“Entergy”), ASA Analysis and Communications, Inc. (“ASA”), Normandeau Associates, Inc. (“Normandeau”) and AKRF, Inc. (“AKRF”; collectively, the “Biological Team”) provided three Hudson River Biological Monitoring Program (“HRBMP”) datasets, respectively in 2007, 2008 and 2014 (respectively, the “2007 Submission,” the “2008 Submission” and the “2014 Submission”), as follows:

- The 2007 Submission was prepared by ASA in response to NRC Staff’s RAI dated November 8, 2007 (Enclosure 2, Item #16) and included data from 1974 through 2005. Three types of datasets were requested and provided for selected species for each of the three sampling programs that constitute the HRBMP, *i.e.*, the Beach Seine Survey (“BSS”), the Fall Shoals Survey (“FSS”) and Long River Ichthyoplankton Survey (“LRS”): 1) total counts of each species over all samples and all life stages, *i.e.*, eggs through adults for a year, and total number of samples collected during the year (referred to at the time as Appendix Table C files), 2) annual indices of young-of-year abundance for each species (referred to at the time as Appendix Table D files), and 3) estimates of density for eggs, larvae, young-of-year and yearling+ (yearling and older fish combined) for each selected species by year, region and sampling period, indicated both by start and end dates (referred to at the time as Appendix Table E files).
- The 2008 Submission was prepared in response to a RAI from NRC Staff dated December 5, 2007, that Entergy supplement the 2007 Appendix Table C files with additional, error-checked (“QA/QC”) information on sample effort (including number of samples, sample volume and counts). The 2008 Submission, provided by Normandeau in February 2008 in response to the December 5, 2007 RAI, reflected a sampling effort and counts for sixteen (16) taxa of fish by year, week and region for the BSS, FSS and LRS in Excel spreadsheets, specifically noting QA/QC limitations for years 1980 and 1981 and other relevant considerations (provided in narrative and tabular summaries) to assist NRC in interpreting and using data in the 2008 Submission.
- The 2014 Submission was prepared by ASA and AKRF in response to NRC Staff’s September 26, 2014 RAI and provided two types of datasets: 1) Format 1 datasets, prepared by AKRF, that contained annual indices of abundance for each selected species, and 2) Format 2 datasets, prepared by ASA, that contained counts and estimates of

density for each of seventeen (17) selected taxa (unidentified Clupeidae Taxon = 50 was added to the sixteen (16) taxa from the 2008 Submission) by year, region and week. The 2014 Submission's Format 2 datasets mirrored portions of the 2007 Submission, but also provided additional aggregation of information requested for the 2008 Submission, *i.e.*, with taxon counts and sampling effort summarized by year, region and week. Further, the portions of the 2007 and 2014 Submissions prepared by ASA employed an identical methodology for constructing the requested datasets from the raw, archived data files, and our review indicates that for overlapping years and overlapping data points (*i.e.*, types of information provided in the 2007 Submission) they are identical. Finally, while the count and sampling effort files prepared for the 2014 Submission can be compared with certain portions of the 2008 Submission, neither of these sets of count and effort files can be used to verify the regional density estimates because the information requested by NRC for these submissions is not adequate to perform those calculations.

As addressed in detail below, NRC's Current RAI poses questions as to why there appear to be differences in the 2008 Submission and the 2014 Submission. The Biological Team examined these two datasets and has determined that the vast majority of the differences noted by the NRC's consultant arise not from data errors or programming errors, but rather from differences in the way the historical datasets were constructed, in the choice of variables used in the different submissions, and differences in criteria used to exclude certain data potentially unreliable for (or more likely to confound) the purpose at hand. For instance, focusing on RAI 4, we identified differences in the method for assigning individual samples a week number (1-52) to represent the week in which the sample was collected. The 2007 Submission did not provide the week number; however, both the 2008 and 2014 Submissions included a week number, but the algorithms used to calculate week were slightly different, and in some years produced differences in week number assigned to a sample. With respect to RAI 5, we also identified a difference relating to the definitions of "Total Count" in the 2008 and 2014 Submissions. In the 2008 Submission, the variable "Total Count" was calculated as the sum of counts over all life stages (egg through adult). The 2014 Submission responded to NRC Staff's request for the sum of young-of-year count plus the count of yearling and older. Thus, the two Total Counts are not the same. However, both are correct total counts for the subset of life stages addressed in the respective Submissions. Finally, and again focusing on RAI 5, we identified slightly different criteria used by Normandeau (2008) and ASA (2014) to identify valid samples.

While the differences noted above are not errors, we identified a limited number of actual errors in data or programming in the 2014 Submission, the majority of which affected a single species (*i.e.*, striped bass) in two years (*i.e.*, 1993 and 1994). Specifically, we identified fifty-nine (59) discrete instances (in more than 265,000 discrete lines of data, as discussed below) where the number of samples collected and/or volume sampled did not match in the 2008 and 2014 Submissions. Of these, thirty-seven (37) resulted from a variation in the way hatchery reared striped bass were recorded in the data files in 1993 and 1994. The remaining twenty-two (22) instances were for species other than striped bass. For these fifty-nine (59) instances, the species counts are correct in both the 2008 and 2014 Submissions, but the sample counts (*i.e.*, number of samples collected) and/or sample volumes are incorrect for the 2014 Submission. While not related to the operative 2014 Submission, in our review of the 2008 Submission, we also identified instances, particularly in the early years of the HRBMP program, *i.e.*, 1980 and 1981,



in which life stage categories that the Biological Team considers synonymous today and historically, *i.e.*, count of length class-1 (“ct\_LC1”) and count of young of the year (“ct\_yoy”), were nonetheless handled differently.

While this verification process has been useful, the few identified errors are insignificant by all reasonable measures. To put in context the information utilized to prepare the 2014 Submission (accounting for years 1979 through 2011, but limited to young of the year and older life stages), the LRS data contained approximately 105,000 “samples” or discrete collections, *e.g.*, one net tow (described in the level 3 and level 4 archival datasets, that have information recorded for each sample on how, when and where that sample was collected). Each sample may contain from zero to many thousands of organisms. The samples collected generated a total of approximately 342,000 “catch” records, with each catch record consisting of the age and length class counts of a taxon captured in a sample (described in a level 5 archival dataset reflecting counts by life stage and age class of the taxa collected in the sample). The FSS in those same years consisted of approximately 63,000 samples, which generated approximately 234,000 catch records. Finally, the BSS consisted of approximately 36,000 samples, which generated approximately 109, catch records. The effort to provide the information requested by NRC in this RAI thus had to access over 1.1 million data records.

To appropriately address NRC Staff’s RAI requests, the 2014 Submission combined information from level 3, 4 and 5 datasets (described above), resulting in 265,387 discrete lines of data (*i.e.*, data for seventeen (17) taxa by year, region, and week) for the Format 2 count files. Our efforts to identify differences between the 2008 and 2014 Submissions identified fifty-nine (59) errors in the Format 2 count files, *i.e.*, **an error rate of 59/265,387 or 0.02%**. Thus, we are confident that identified differences in the 2014 Submission are insignificant on a technical or scientific basis, and do not alter the conclusions to be derived from the 2014 Submission or in the Final Supplemental Environmental Impact Statement (“FSEIS”) regarding the potential adverse impact to individual species. In an industry with no definitive published data standards, it may be worth noting that the routine QA/QC program for HRBMP data files employs a one percent (1%) maximum allowable error rate, but produces actual error rates that are well below this standard. The HRBMP QA/QC approach was state-of-the-art when designed, and remains the model for the industry. *See, e.g.*, Geoghegan, *The Management of Quality Control and Quality Assurance Systems in Fisheries Science*, Fisheries Vol. 21, No. 8, p. 14 (1996).

In sum, the Biology Team appreciates NRC Staff’s efforts to independently validate the various Submissions, and believes that the process has been useful in allowing the Biology Team to again review and validate these lengthy datasets. The 2014 Submission is the most current, *i.e.*, contains data from 1979 through 2011, and for additional reasons discussed in detail below should be treated as the operative dataset that provides the level of aggregation that NRC requested of Entergy in the 2008 Submission. We are confident in the correctness of the 2014 Submission, which provides an accurate record of the historical data including additional years after the gear changes in the FSS that occurred in 1985. The 2014 Submission is also consistent with the 2007 Submission originally provided to NRC with respect to overlapping years and categories of data and with the 2008 Submission, except as noted below. For these reasons, the 2014 Submission, particularly with the correction of a limited number of errors addressed below, should be relied upon by NRC staff in updating the FSEIS.

## RAI 1

**Basis:** “The U.S. Nuclear Regulatory Commission (NRC) staff is in the process of performing an independent verification of Entergy Nuclear Operations, Inc.’s (Entergy’s) February 19, 2014, submission by using the data from Entergy’s October 27, 2014 response to RAIs. The results indicate that the [sic] Entergy’s “Format 1” dataset submitted in October 2014 differs from the dataset used in the February 2014 submission. In order to conduct its independent verification, the NRC staff must understand how and why the datasets appear to differ.”

**Request:** “Provide a clear written explanation of how and why the “Format 1” data in Entergy’s October 2014 response to RAIs differ from the dataset used in Entergy’s February 2014 submission, and if the data differ, provide the “Format 1” data used for the February 2014 analysis. Support the explanation of the difference with selected SAS code used to create both data sets. Pay particular attention to the calculation of catch-per-unit-effort (CPUE) and density in the two submissions. Also, SAS and other statistical software provide several methods to calculate percentiles, and these can return different results when applied to the same data. Provide the method and cite the software used to determine the 75<sup>th</sup> percentile of the data.”

**Response:** The “Format 1” data in Entergy’s 2014 Submission were computed from the “Format 2” data requested by NRC Staff and provided by Entergy in its 2014 Submission. In contrast, the input data to Entergy’s February 2014 Final Supplemental Environmental Impact Statement data analysis update (“Entergy’s February 2014 FSEIS Update Report”) were computed directly from the archival data files from the HRBMP. This is the basis for any differences between the “Format 1” data in the 2014 Submission and the input to Entergy’s February 2014 FSEIS Update Report.

The methods used ultimately to calculate the 75<sup>th</sup> percentile of the CPUE and density data are as follows:

1. **Assignment of week number to data from the raw data files.** The information contained in the raw data files includes, among other things, the date each sample was collected. For purposes of calculating weekly values, for Entergy’s February 2014 FSEIS Update Report, each sample was assigned to a week bounded by Monday through the following Sunday. The following SAS lines of code were used to perform this assignment:

```
WEEK=INT((((DATE)-(INTNX('WEEK',MDY(12,30,YEAR(DATE)-1),1)+1))/7)+1;
```

The SAS function INTNX('WEEK',MDY(12,30,YEAR(DATE)-,1) returns the date of the Sunday of the week containing December 30<sup>th</sup> of the year preceding the sampling date (DATE). Accordingly, this line of code assigns a value of  $k$  to any dates within the week that begins with the  $k^{\text{th}}$  Monday of the year.

As explained in the 2014 Submission and as further addressed in the Response to RAI 4 below, the calculation of the weekly data for purposes of building the “Format 2” data file was based upon the historic practice of adjusting the date of a Sunday sample in those limited circumstances in which a Sunday sampling event occurred due to a holiday falling on a normal collection day (*i.e.*, Monday through Friday). We note that the “Format 2” data file contains only weekly data (calculated using the adjustment described in the Response to RAI 4 below) and does not contain daily sample collection information. Thus, there was no processing of the data required to convert daily to weekly information in that file.

**2. Calculation of CPUE and Density.** Descriptions of the methods used to calculate CPUE and Density for the Format 1 and Format 2 datasets were provided in the report titled, “Data Documentation for Information Provided to U.S. Nuclear Regulatory Commission In Response To 9/26/14 Request For Additional Information” which was included in the 2014 Submission. For Entergy’s February 2014 FSEIS Update Report, the same methods were used to compute CPUE and Density.

**3. Calculation of the 75<sup>th</sup> Percentile of Data.** The following SAS code was used to calculate the 75<sup>th</sup> percentile of data:

```
proc means data=data3 noprint;
  var density cpue count nsamp sampvol;
  by program year taxon species region;
  output out=data4 p75(density cpue)=density75 cpue75
    sum(count nsamp sampvol)=count nsamp sampvol;
run;
```

This code specified the SAS default method for calculating the 75<sup>th</sup> percentile values of CPUE and Density. The SAS default method is described as follows (excerpt from SAS documentation):

Let  $n$  be the number of non-missing values for a variable and let  $x_1, x_2, \dots, x_n$  represent the ordered values such that  $x_1$  is the smallest value,  $x_2$  is next smallest value, and  $x_n$  is the largest value. For the  $t^{\text{th}}$  percentile, let  $p=t/100$ . Then let

$$np = j + g$$

where  $j$  is the integer part and  $g$  is the fractional part of  $np$ .

The  $t^{\text{th}}$  percentile,  $y$ , for example, is defined by using the empirical distribution function with averaging:

$$y = (x_j + x_{j+1}) / 2 \text{ if } g=0$$

$$y = x_{j+1} \text{ if } g>0.$$

Although a “Format 1” data file, per se, was not generated for the analyses described in Entergy’s February 2014 FSEIS Update Report, in response to RAI 1, AKRF has prepared a “Format 1” data file corresponding to the data used as input to those analyses. Enclosed is a copy on CD of the “Format 1” data file for the data used as input to Entergy’s February 2014 FSEIS Update Report.

## **RAI 2**

**Basis:** “As part of the NRC staff’s independent verification of Entergy’s February 2014 submission, the NRC staff needs to refer to information from the Hudson River Sampling Program.”

**Request:** “Provide electronic copies of the Hudson River Year Class Reports for years 2006 through 2011. Entergy has already provided electronic copies for previous years.”

**Response:** The enclosed compact disc contains electronic copies of the Hudson River Year Class Reports for years 2006 through 2011.

## **RAI 3**

**Basis:** “Entergy’s October 2014 submission includes a letter to Ms. Dara Gray informing her of the quality assurance methodology employed on the October 2014 data submission. The letter states that the intermediate results of analyses were not identical to the results presented in tables supplied with Entergy’s February 2014 submission.”

**Request:** “Provide the intermediate tables comparing models, assessment of potential impacts, strength of connection analysis parameters and results, and the weight of evidence conclusion tables from the October 2014 submission.”

**Response:** Entergy’s February 2014 FSEIS Update Report included 24 tables (Table 3 through Table 26) listing intermediate and final results of the updated FSEIS aquatic impacts analysis described in that report. Those tables addressed alternate trend models, potential impacts (based on trends), strength of connection parameters and results, and weight of evidence conclusions.

For purposes of comparison with Tables 3 through 26 of Entergy’s February 2014 FSEIS Update Report, enclosed on the compact disc with this RAI Response are 24 tables of intermediate and final results (in the same format as the tables in Entergy’s February 2014 FSEIS Update Report) based on the “Format 2” data from the 2014 Submission, with corrections as described below.

## **RAI 4**

**Basis:** “Entergy’s October 2014 submission includes a letter to Ms. Dara Gray informing her of an adjustment to the assignment of data associated with a given week, *i.e.*, selected Sunday samples were assigned to the following work week instead of the prior week. The letter also states that this adjustment was made to the data submission provided to the NRC staff from Entergy by letter dated March 7, 2008. The October 2014 letter states that “sampling occurred

on a Sunday because a holiday occurred within the work week; however, the standard algorithm used to assign a week based upon date resulted in the Sunday samples being assigned to the prior week.” As part of NRC staff’s review of the data received in October 2014 with that received prior to preparation of the June 2013 supplement to the Final Supplemental Environmental Impact Statement for Indian Point Nuclear Generating Unit Nos. 2 and 3, NRC staff found that the week number assigned to the samples was not always consistent between the two datasets.”

**Request:** “Provide a comparative key to the 2008 and 2014 week number assignments.”

**Response:** As an initial response, we understand RAI 4’s reference to the data “received prior to the preparation of the June 2013 supplement to the [FSEIS]” to be referring to the 2008 Submission. As part of the 2008 Submission, Normandeau prepared a document entitled, “NRC Request for Sampling Effort and Abundance Data from Three Hudson River Sampling Programs for 16 Selected Fish Species During 1974 through 2005,” dated February 25, 2008 (“Normandeau 2008 Report”). That document explained the adjustment to the assignment of week to particular data records:

The variable week (Sunday to Saturday) was assigned in SAS code, based on the date when the sample was taken. However, upon inspection of the resulting distribution of samples, it was evident that some samples were misclassified using this algorithm and assigned the previous or subsequent week. A review of corresponding annual year class reports in cases where sample numbers did not appear to properly align with week boundaries allowed for the proper reassignment of week to these data. In most cases reclassification of Sunday dates was necessary to align the week to represent a completed survey, because the last date of sampling week occurred on Sunday to complete the previous week’s sampling plan.

Normandeau 2008 Report, pp. 2-3. Thus, the adjustment to the assignment of “week” to certain data records was expressly addressed in the 2008 Submission.

As further background, it is important to underscore that the sampling effort for each of the River-wide surveys, *i.e.*, the LRS, FSS, and the BSS, is conducted as a “river run” in which the entire river (or portion intended) is sampled. Generally, a river run is conducted from Monday through Friday of the same calendar week, but occasionally some samples for a river run are conducted outside this five day period, *e.g.*, due to holidays, inclement weather or equipment failure. When that occurs, some samples for particular river runs could occur within a different week, depending upon the method used to assign a week to the sampling effort. Because the term “week” is not a defined variable that is stored in the datasets, there is not a standardized method of calculation. Instead, week must be assigned by the data user according to the purpose of the analyst and their professional judgment. For analyses conducted by the Biological Team, the week number is used to indicate the approximate timeframe during which the river run occurs. Three different methods of assigning weeks have been used, although the application of each method routinely, though not always, assigns the same week to a given sample. The three methods are described as follows:

Method A: A “week” is defined as Monday-Sunday. All days occurring prior to the first Monday in January are assigned to week 1, with subsequent weeks following sequentially. Any sample dates that receive a week number different from the rest of the river run are individually adjusted so as to be grouped with the other data within that river run. Typically, this occurs when sampling for a river run begins on Sunday rather than Monday because a holiday occurs within the week, but occasionally weather or equipment issues cause a delay in sampling resulting in the river run ending on Sunday. This method was used by ASA in the 2007 and 2014 Submissions, although week and river run information were neither requested, nor provided to NRC in the 2007 Submission.

Method B: A “week” is defined as Sunday-Saturday. All days occurring prior to the first Sunday in January are assigned week 0, with subsequent weeks following sequentially. Sample dates that receive a week number different from the rest of the river run are individually adjusted so as to be grouped with the other data within that river run. As discussed above and in the Normandeau 2008 Report, this method was used by Normandeau in the 2008 Submission.

Method C: A “week” is defined as Monday-Sunday. All days occurring prior to the first Monday in January are assigned week 1, with subsequent weeks following sequentially. Sample dates that receive a week number different from the rest of the river run are not adjusted. This method was used by AKRF in Entergy’s February 2014 FSEIS Update Report.

Methods A, B and C will assign the same week to any particular sampling date, except in the following circumstances:

- (1) Method B assigns a week number that is one less than assigned by Methods A or C in years when January 1 occurs on a Monday. This is the reason for the consistent week number differences noted in 1979, 1990, 1996, 2001 data records; and
- (2) Method C sometimes places Sunday samples in a different week than the rest of the samples for the same river run, but only if the Sunday sample is collected on the Sunday prior to the Monday at the start of the week.

All data provided in the 2014 Submission used Method A to assign a sample to a particular week, which is why the analysis provided in Entergy’s February 2014 FSEIS Update Report differs slightly from the tables provided in October 2014. When either the start or end date for sampling within a region in the “Format 2” data in the 2014 Submission or the 2008 Submission falls on a Sunday, the week number was adjusted to match the rest of the same river run. Despite these minor differences in Methods A, B, and C, it is important to underscore that the application of any one of these Methods provides substantively similar results in the final analysis of the data for purposes of assessing impacts to individual fish species.

The enclosed compact disc contains a set of tables that provides the week number assigned to all count and density data in the 2008 and 2014 Submissions and in Entergy’s February 2014 FSEIS Update Report. These tables will allow NRC staff to understand the correspondence of the sampling weeks across the different surveys, and the differences between week assignments in the 2008 and 2014 Submissions and in Entergy’s February 2014 FSEIS Update Report.

## RAI 5

**Basis:** “As part of NRC staff’s review of the data received in October 2014, the NRC staff found that those data were inconsistent with data received from Entergy by letter dated March 7, 2008. For example, those data for striped bass sample size and volume in the Fall Shoals Survey, River Segment sample for week 41, 1994.”

**Request:** “1) identify differences (for example in week number, number of samples, volume of samples, number of young-of-year caught, and total number of fish caught) between the October 2014 [data] and those data received in the March 7, 2008, and the December 2007 data disks (labeled IPEC License Renewal – Environmental, Letter NL-07-156, 12/20/07, Enclosures, Disc 1 of 2 data submittal); 2) provide reasons for the differences and rationale for the differences, if any; and (3) provide the corrected version, as appropriate.”

**Response:** We compared the counts of young-of-year and older fishes, and the sampling effort and volume data, for the LRS, FSS and BSS for the overlapping years in the 2007 and 2014 Submissions, *i.e.*, from 1979 through 2005, and as indicated above found no differences.

We also compared the counts of young-of-year and older fishes, and the sampling effort and volume data, for the LRS, FSS and BSS for the overlapping years in the 2008 and 2014 Submissions, *i.e.*, from 1979 through 2005, and in this case identified a limited number of insignificant differences, an even smaller subset of which are errors. Thirty-three (33) of the differences of species counts result from the differences in week assignment, as discussed above for RAI 4 and are therefore not errors. The remaining differences can be separated into three (3) categories, two (2) of which are not reasonably considered errors, and one (1) of which is correctly treated as a dataset error:

- **Total Count Differences:** In the 2014 Submission, as requested by NRC, only young-of-year and fish older than young-of-year were included in the “total counts” column. In the 2008 Submission, by contrast, the number of eggs and larvae were provided and were included in the “total counts” column. Thus, the components of the total counts columns in these Submissions differ as a result of the identified differences in what was included in the “total count” column in each Submission. This difference, which is not an error, accounts for the vast majority of differences between the 2008 and 2014 Submissions.
- **Sample exclusion criteria differences:** In any large dataset, there will be records that may not be suitable for all purposes, so “exclusion criteria” are typically used to allow the person or entity processing the dataset to make informed decisions about whether to remove certain records prior to conducting an analysis. The datasets in both the 2008 and 2014 Submissions were restricted to using only “use code” = 1 samples, *i.e.*, those samples that were taken without sampling problems and are suitable for calculating catch per unit effort or average densities. The 2014 Submission also excluded six (6) LRS samples with missing volumes, and four (4) FSS samples with a “sample narrative” indicating some problems during the laboratory analysis. These additional discretionary exclusions resulted in sixteen (16) differences in counts or volumes in the LRS data, and

twenty-two (22) differences in the FSS data, or a total of thirty-eight (38) differences, between the 2008 and 2014 Submissions. These differences reflect different use of disclosed exclusion criteria. Thus, they are not errors.

- **Hatchery Raised Striped Bass (1993 and 1994):** The catch records for the BSS and FSS are constructed with a single data record for each species observed in a sample. However, in the 1993 and 1994 BSS and FSS catch records, the method of identifying and recording recaptured hatchery-raised striped bass was changed, with the result that the hatchery-raised fish are recorded in the dataset in a separate record from wild striped bass. The software used to calculate the catches and densities for both the 2007 and 2014 Submissions interpreted these additional catch records for hatchery-raised fish as additional samples. When hatchery-reared fish were captured, *i.e.*, thirteen (13) combinations of regions and weeks in FSS in 1994, nine (9) in BSS in 1993, and fifteen (15) in BSS in 1994, the total count of striped bass was reported correctly, but the sample sizes and volumes reported for a given week and region were inflated. This is therefore an error, not merely a difference. An additional twenty-two (22) samples in the FSS program for the 2014 Submission included multiple catch records for other species within the years examined. There are a total, over all species including striped bass, of fifty-nine (59) errors in this category, affecting both the count and the density/cpue files. Due to the way the calculations were performed for the 2008 Submission which did not calculate density (but reported volume separate from counts), those results were not affected by the multiple catch records. In response to RAI 5, sub-item (3), the enclosed CD contains a replacement set of "Format 2" data files for the 2014 Submission that have the fifty-nine (59) errors corrected. The replacement files have also been padded with records that indicate weeks when some regions were not sampled. These records indicate 0 samples and 0 volumes.

Our efforts to track any changes in the data provide to NRC uncovered one additional item that arose from a typographical error in the 2008 Year Class report that was carried through to later reports. The LRS index value for PYSL/YOY Atlantic tomcod in 2008 was incorrectly listed as <0.001, rather than the correct value of 0.0345. The Format 1 and Format 2 files provided on the enclosed CD contain the correct value.

One other consideration in the 2008 Submission is worth calling out. All three sampling programs use a dual system for recording counts of young-of-year and older fishes. The length class count system uses the variables ct\_LC1 (for count of length class 1 fish), ct\_LC2, ct\_LC3, and ct\_LC4. The age class count system uses ct\_yoy (for count of young-of-year fish), ct\_yrln, ct\_older, and ct\_yr\_ol. The counts are intended to be transposed from one count system to the other, but the practice for recording both systems in the database was different in the early years of the LRS (prior to 1982) than in subsequent years. For the 2008 Submission, Normandeau reported the variable ct\_LC1, rather than ct\_yoy in some of the data tables, whereas for the 2007 and 2014 Submissions the variable ct\_yoy was reported. As indicated in the data documentation submitted with the 2008 Submission, the ct\_yoy and ct\_LC1 variables are intended to be synonymous, and therefore the Biological Team expected them to contain the same numeric value. However, in the LRS data records for 1980 and 1981, the ct\_LC1 variable does not match the ct\_yoy variable in many instances, *i.e.*, 479 differences were identified in 1980 and 1981,



which resulted in catches recorded for 1980 and 1981 not agreeing with those in the 2014 Submission. We have not contacted the prior consultants to determine whether the 1980 and 1981 approach was deliberate, but our expectation remains that the values of ct\_LC1 and ct\_yoy should be the same. Thus, we believe disclosing these differences is important. Because NRC Staff uses the LRS solely for the analysis of impacts to Atlantic tomcod, the practical effect of this two-year anomaly is limited to Atlantic tomcod data entries. That said, a total of fifteen (15) additional instances of ct\_LC1 not being equal to ct\_yoy that do not relate to Atlantic tomcod affect the 2008 Submission, *i.e.*, nine (9) in the LRS, and three (3) each in the FSS and BSS datasets. None of these differences affects the 2014 Submission, which used only the age class count variables.