# comprehensive Data delivery README FILE

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| **Study Section** | Study 9.8: Fish and Aquatics River Productivity  |
| **Study Component** | River Productivity (RIVPRO) in the Lower, Middle, and Upper Susitna River Hydrologic Segments |
| **Field Date Range** | June 19, 2013 ─ September 29, 2014 |

**Introduction:** The overarching goal of this study is to collect baseline data to assist in evaluating how the effects of Project-induced changes on flow and flow-rrelated environmental factors (temperature, substrate, water quality) may affectthe benthic macroinvertebrate and algal communities in the Middle and Lower Susitna River. Study 9.8 focused on macroinvertebrate and algal communitieswith the potential to be affected by construction and operation of the proposed Susitna-Watana Hydroelectric Project (Project) in Alaska.

The following ten specific objectives have been developed for both Study 9.8, a few of which include multiple tasks.

1. Synthesize existing literature on the impacts of hydropower development and operations (including temperature and turbidity) on benthic macroinvertebrate and algal communities.
2. Characterize the pre-Project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the Middle and Lower Susitna River.
3. Estimate drift of benthic macroinvertebrates in selected habitats within the Middle and Lower Susitna River to assess food availability to juvenile and resident fishes.
4. Conduct a feasibility study in 2013 to evaluate the suitability of using reference sites on the Talkeetna River to monitor long-term Project-related change in benthic productivity.
5. Conduct a trophic analysis to describe the food web relationships within the current riverine community within the Middle and Lower Susitna River.
6. Develop habitat suitability criteria for Susitna benthic macroinvertebrate and algal habitats to predict potential change in these habitats downstream of the proposed dam site.
7. Characterize the invertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component).
8. Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the Middle and Lower Susitna River.
9. Estimate benthic macroinvertebrate colonization rates in the Middle Susitna Segment under pre-Project baseline conditions to assist in evaluating future post-Project changes to productivity in the Middle Susitna River.
10. Measure productivity in select Susitna River tributaries and lakes above Devils Canyon.

Field data collection efforts in 2013 and 2014 were pertinent to study objectives 2,3,4,5,7,8,9 and 10.The River Productivity Study collected detailed spatial and seasonal data on baseline conditions of benthic macroinvertebrates, periphyton, invertebrate drift, benthic and drift organic matter, trophic relationships via growth modeling and stable isotope analysis, benthic macroinvertebrate colonization dynamics in the Lower and Middle Susitna River, and additional information on benthic community resources in various upper basin tributaries and a major lake system. Data collected as part of these studies will be used to provide a baseline characterization of benthic macroinvertebrate and algal communities in the Susitna River in support of identification and evaluation of potential Project-induced effects (flow and interrelated environmental factors) on benthic macro-invertebrate and algal communities, and inform development of any necessary protection, mitigation, and enhancement measures.

**Data Summary:** This multi-year study was initiated with the first year of study in 2013 and ongoing sample processing and limited field work in 2014. Field data collection activities in 2013 included repeated seasonal sampling for benthic macroinvertebrates, periphyton, invertebrate drift, benthic colonization, benthic and drift organic matter, and fish diet and tissue sampling to support trophic modeling. Field data collection in 2014 was largely focused on five study components: 1) data collection to support the needs of the trophic modeling and stable isotope analysis objectives of the study; 2) invertebrate drift sampling; 3) fish stomach content data collection and diet analysis, 4) stable isotope analysis and 5) trophic modeling. Additional activity in 2014 included a one-time sampling event to evaluate productivity in selected tributaries and lakes upstream of Devils Canyon. This effort produced data on benthic macroinvertebrates, periphyton, invertebrate drift, plankton, benthic and drift organic matter, and water quality.

The data for 2013 and 2014 are stored in separate databases and include the field data and laboratory results for each year. The data structure is similar between years and consists of detailed information about field data collection sites (location, habitat type, water quality), worksheets for field data collection methods by sample type (algae, benthic drift, Ponar grab samples, Hess samples, and plankton tows) with collection details (sample IDs, collection time/duration, sample volumes, sample depths and substrate), and corresponding worksheets for laboratory results by sample type (analysis methods, parameters, sample weights, taxon types, and taxon tallies). In addition, the databases include worksheets for other study components including fish diet (fish collections and disposition, sample IDs aging results, stomach content results), insect emergence traps, and additional synoptic water quality data collection, methods and results.

Data were collected in accordance with the methods outlined in the River Productivity Implementation Plan with the exception of the variances identified in the ISR Part D (November 2015). Data management followed the QA/QC protocol described in the Implementation Plan ultimately resulting in a relational database of all river productivity-related data collected for the Susitna-Watana Project.

Data have undergone 5 levels of data quality control (QC), named QC1 to QC5. The QC levels, briefly, are as follows:

* QC1–Field Review: Review of field forms before leaving the field, or the QC level of raw data collected via field equipment such as water quality probes, cameras, GPS units, etc.
* QC2–Data Entry: Data from paper forms are entered into an electronic format and verified.
* QC3–Senior Review: Final review by senior professional before submitting field data to AEA, or the QC level of raw data cleaned up for delivery to AEA.
* QC4–Database Validation: Tabular data files are verified to meet Project database standards.
* QC5–Technical Review: Data revision or qualification by senior professionals when analyzing data for reports.

**Data Organization:**  2013 and 2014 data are stored as separate MS Access relational databases.

Databases are accompanied by data dictionaries for information such as table and attribute descriptions and relationship keys.

Fish captures by RIVPRO field crews are stored in the RIVPRO databases, and are also copied to the 9\_5\_6 FDA Events database as these fish were included in fish distribution analysis.

**Software Considerations:** MS Access version 2003 or newer is needed for database use.

**Online Data Link:** <http://gis.suhydro.org/SuWa/09-FISH/9.08-RIVPRO/>

File 9\_FAQ\_Database\_Data\_Dictionary\_20170630.pdf at <http://gis.suhydro.org/SuWa/09-FISH/00/FAQ_Data_Documentation/>

**Online Report Link:** AEA has prepared several documents with data pertaining to this study component. However, because database QC is an ongoing process, the most recent version of the data found through the hyperlink above may supersede the results reported in study documents. Copies of the datasets used for analysis in the ISR and SIR are available through the hyperlink found at the beginning of the results section (Section 5). To aid review, study documents using this study component are listed below. Each of these documents is accessible on AEA’s Project licensing website (<http://www.susitna-watanahydro.org/type/documents/>) or through FERC’s eLibrary system (<http://www.ferc.gov/docs-filing/elibrary.asp>), in Docket No. P-14241.

| **Title** | **Date** | **Description** | **Link** |
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| Draft Initial Study Report for Study 9.8 | 2/3/2014 | This draft of the ISR summarized the study methods and variances during the 2013 study season, and presented preliminary data collected for Study 9.8. This draft ISR was later republished as Part A of the final ISR. | [Draft ISR Part A for Study 9.8 (File 1)](http://www.susitna-watanahydro.org/wp-content/uploads/2014/01/09.08_RIVPRO_ISR_Draft_1_of_2.pdf)[Draft ISR Part A for Study 9.8 (File 2)](http://www.susitna-watanahydro.org/wp-content/uploads/2014/01/09.08_RIVPRO_ISR_Draft_2_of_2_App_A-D.pdf) |
| Initial Study Report for Study 9.8 | 6/3/2014 | This document is the Initial Study Report (Parts A, B and C) for Study 9.8. Part A republishes the Draft ISR. Part B identifies supplemental information and errata in Part A. Part C presents study modifications and plans for completing the study. | [ISR Part A for Study 9.8 (File 1)](http://www.susitna-watanahydro.org/wp-content/uploads/2014/05/09.08_RIVPRO_ISR_PartA_1_of_2.pdf)[ISR Part A for Study 9.8 (File 2)](http://www.susitna-watanahydro.org/wp-content/uploads/2014/05/09.08_RIVPRO_ISR_PartA_2_of_2_App_A-D.pdf)[ISR Part B for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/06/09.08_RIVPRO_ISR_PartB.pdf)[ISR Part C for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/06/09.08_RIVPRO_ISR_PartC.pdf) |
| Analysis of Potentially Dewatered River Productivity Sampling Sites in 2013 | 6/3/2014 | This document is included in the ISR Part A as Appendix C. This technical memorandum provides detail on the approach taken to provide an estimate of how many Hess samples taken during 2013 on the Susitna River were potentially dewatered during the 30 days prior to being collected, and provides an estimate of the proportion of samples subject to dewatering. | [June 2014 TM for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/05/09.08_RIVPRO_ISR_PartA_2_of_2_App_A-D.pdf) |
| 2013 Initial River Productivity Results Technical Memorandum | 9/26/14 | This technical memorandum provides a preliminary review and summary of 2013 River Productivity Study sample results based on laboratory data received after the ISR submittal in June 2014. | [Sept. 2014 TM for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/09/2013-Results_RivProTM_09172014.pdf) |
| 2014 Field Season River Productivity Progress Report Technical Memorandum | 9/26/2014 | This technical memorandum presents an update on activities conducted during the Spring field sampling event in June 2014, which was focused on data collection to support the needs of the trophic modeling and stable isotope analysis objectives of the River Productivity Study. | [Sept. 2014 TM for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/09/9-08-RIVPRO-TM_2014_Spr.pdf) |
| Initial Study Report, Errata to Appendix A | 11/26/14 | Errata to the whitepaper “Review of the Effects of Hydropower on Factors Controlling Benthic Communities” properly crediting the source of some of the content used in the review. | [Nov. 2014 TM for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2015/11/20141126_AEA_ErrataTo20140603and20141114filings.pdf) |
| Fish Diet Sample Size Sufficiency Analysis Technical Memorandum | 12/17/2014 | This technical memorandum describes an analysis of stomach contents samples conducted after field sampling was completed to determine whether the sample size targets and the actual sample sizes were sufficient to meet the Study Plan objectives. | [Dec. 2014 TM for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2014/12/9_08_RIVPRO_TM_DietSampleSizeSufficiency.pdf) |
| 2014 Study Implementation Report for the River Productivity Study (9.8) | 11/4/2015 | This report presents the methods and preliminary results of all data collected for the 2014 River Productivity Study, along with variances to study methods, as well as the remainder of results the 2013 River Productivity Study not included in the “2013 Initial River Productivity Results Technical Memorandum” (benthic macroinvertebrates on LWD, emergence trap samples, organic matter contents), and a discussion of results. | [2014 SIR for Study 9.8 (File 1)](http://www.susitna-watanahydro.org/wp-content/uploads/2015/11/09.08_RIVPRO_ISR_SIR.pdf)[2014 SIR for Study 9.8 (File 2)](http://www.susitna-watanahydro.org/wp-content/uploads/2015/11/09.08_RIVPRO_ISR_SIR_Appx-A-B.pdf) |
| Initial Study Report –Part D for Study 9.8 | 11/6/2015 | The purpose of Part D of the Initial Study Report for Study 9.8 is to report on any additional implementation of the Study Plan from June 2014 to the end of the 2014 calendar year. | [ISR Part D for Study 9.8](http://www.susitna-watanahydro.org/wp-content/uploads/2015/11/09.08_RIVPRO_ISR_PartD.pdf) |
| Response to Comments on the Initial Study Report, Study 9.8, Section 2.6.4 | 10/24/2016 | This document contains AEA’s responses to agencies’ comments and study modification requests in regards to their review of the ISR. | [AEA ISR Comment Response for Study 9.8, Section 2.6.4](http://www.susitna-watanahydro.org/wp-content/uploads/2016/11/ISR_Response_OCT_2016.pdf) |

**[[1]](#endnote-1)**

1. **Data Distributor Contact Information:**

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