DRAFT REPORT (VERSION 1)

OKANOGAN BASIN MONITORING AND EVALUATION PROJECT (OBMEP) DATABASE USER'S MANUAL:

Prepared for:

Colville Confederated Tribes
23 Brooks Tracts Rd
Omak, WA 98841

Prepared by:

Summit Environmental Consultants Ltd.
#200 - 2800 29th Street
Vernon, B.C. V1T 9P9

Project 652-01.07

August 2007

SUMMIT
ENVIRONMENTAL CONSULTANTS LTD.
ISO 9001 AND 14001 CERTIFIED
#200 - 2800 29th Street
Vernon, BC V1T 9P9
TEL 250 545-3672 FAX 250 545-3654
www.summit-environmental.com

August 28, 2007

Reference: 652-01.05

Mr. John Arterburn
Anadromous Fisheries Biologist
Colville Confederated Tribes Fish and Wildlife Department
23 Brooks Tracts Rd.
Omak, Washington
98841

Dear Mr. Arterburn:

Re: OBMEP Database User's Manual

Summit Environmental Consultants Ltd. is pleased to provide **Draft Version 1** of the User's Manual for the Microsoft Access Okanogan Basin Monitoring and Evaluation Project (OBMEP) database. The purpose of this manual is to provide Colville Confederated Tribes staff with details regarding development of the database, including the database design, the data entry forms and pre-designed output queries, reports, and form templates.

Also included are step-by-step database procedures for running pre-designed queries, reports, and forms; creating simple queries; creating pivot chart forms; and exporting output queries, reports and forms for presentation and information on database security, database limitations, trouble shooting and quality assurance/quality control.

It is a pleasure working with the Colville Confederated Tribes on this important project.

Yours truly,

Summit Environmental Consultants Ltd.

Rebekka Lindskoog, B.Sc., R.P.Bio.
Database Coordinator, Biologist

TABLE OF CONTENTS

LETTER OF TRANSMITTAL i

TABLE OF CONTENTS ii

LIST OF APPENDICES iii

LIST OF TABLES iii

LIST OF FIGURES iii

1.0 INTRODUCTION 1
- 1.1 Project Background 1
- 1.2 Project Objectives 1

2.0 DEVELOPMENT METHODS 2
- 2.1 Review of Data Sources 2
- 2.2 Modification of the Database Design 3
- 2.3 Consistency Evaluation 3
- 2.4 Collaboration with CCT Staff 3
- 2.5 Development of User's Manual and Database Design 3

3.0 DATABASE DESIGN 4

4.0 DATABASE PROCEDURES 7
- 4.1 Data Entry Forms 7
- 4.2 Pre-Designed Output Queries, Reports and Forms 8
  - 4.2.1 Queries 9
  - 4.2.2 Reports 12
  - 4.2.3 Forms 12
- 4.3 Creating Simple Queries 13
- 4.4 Creating Pivot Chart Forms (Graphs) 14
- 4.5 Exporting Output Queries, Reports and Forms 15

5.0 DATABASE SECURITY 15

6.0 DATABASE LIMITATIONS 16

7.0 TROUBLESHOOTING 17

8.0 QUALITY ASSURANCE/QUALITY CONTROL 17

LIST OF APPENDICES

Appendix A. Table and Field Descriptions.

Appendix B. Entries in the Lookup Tables.

Appendix C. Original Requests for Outputs.

LIST OF TABLES

Table 4.1 List and description of the data entry forms. 8

Table 4.2 Pre-designed output queries 11

Table 4.3 Pre-designed output reports 12

Table 4.4 Pre-designed charting output forms (charts) 13

LIST OF FIGURES

Figure 3.1. Summary of the table relationships in the database design. 6

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Since May 2006, Summit Environmental Consultants Ltd. has been working with the Colville Confederated Tribes (CCT) to develop a fully-functional Microsoft Access database designed and constructed for the Okanogan Basin Monitoring and Evaluation Project (OBMEP). The OBMEP project includes many sampling efforts (data collected and managed by the CCT), specifically snorkel surveys, trap surveys, video surveys, habitat surveys, redd surveys, water chemistry analyses, and hourly river water temperature measurements. In addition to these sampling efforts, the CCT also manages data collected by other agencies such as: the Wells Dam Fish Passage data; the Department of Ecology (DOE) water quality, temperature and flow data; the United States Geological Survey (USGS) temperature and flow data; and the Environment Canada flow and temperature data. The purpose of this manual is to provide Colville Confederated Tribes staff with details regarding development and use of the database, including the final design, the data entry forms and pre-designed output queries, reports, and form templates.

1.2 PROJECT OBJECTIVES

The general objective of this project is to develop a database design (in Microsoft Access format) to accommodate the various data types that CCT manages. The design standardizes the format of the various data types so that they can be combined for data analyses and reporting.

Specific objectives of this project are to:

- Develop a Microsoft Access database design to accommodate data;
- Develop uploading procedures (i.e., the protocol document, under separate cover);
- Develop appropriate analysis routines;
- Lead a training workshop to demonstrate the database operations to CCT staff; and
- Provide continuous support for uploading and developing analysis routines.

The purpose of the final report is to:

- Provide a description of the development methods (e.g., data source review, consistency evaluation of other available databases, and collaboration with CCT staff);
- Present the database design, including the pre-designed output queries, reports and forms;
- Provide database procedures (e.g., running pre-designed queries, reports, and forms; creating simple queries; creating pivot chart forms (graphs); and exporting output queries, reports and forms);
- Provide solutions for common troubleshooting problems; and
- Describe the next phase of development.

2.0 DEVELOPMENT METHODS

2.1 REVIEW OF DATA SOURCES

The CCT has provided Summit with the following:

- Original OBMEP database;
- Excel spreadsheets containing examples of various data types and outputs collected and managed by CCT;
- Annual reports and email requests demonstrating typical output calculations and graphs;
- The sampling protocols for all data types being considered in the database design;
- Links to internet sources of data collected by other agencies and managed by CCT.

Summit reviewed the original data files to identify database fields, key variables and field types. Unique queries were run on each field to determine the range of data that are collected, and to review the arrangement of fields and tables. The results of these queries were used to identify design modifications that will make the database run more efficiently.

2.2 MODIFICATION OF THE DATABASE DESIGN

The original OBMEP database design (received in July 2006) has been modified to a fully-functional relational database. These modifications include addition of lookup tables and lookup fields that enforce referential integrity of the data, as well as indexing fields which will allow queries to run more efficiently. To facilitate data entry into the database, pre-designed entry forms and/or Excel templates can be used by users familiar with the database design. Pre-designed queries, reports and forms were developed through review of annual reports and email requests from CCT staff.

2.3 CONSISTENCY EVALUATION

Summit has had numerous discussions with Steve Rentmeester, Environmental Data Services Contractor to NOAA-Fisheries, to ensure that the OBMEP database design is compatible with the ISEMP (Integrated Status and Effectiveness Monitoring Program) database. Data sharing between the two databases will therefore be straightforward.

2.4 COLLABORATION WITH CCT STAFF

Numerous design iterations were reviewed by CCT staff to ensure the design meets the needs of all staff (i.e., ease of use of the entry forms, incorporation of all data fields, functionality of the database). Summit also worked closely with CCT staff to develop a protocol document (under separate cover) to provide step-by-step procedures for translating the database components that are downloaded from Trimble units or from the internet into the pre-designed OBMEP Microsoft Access database. The development of this document has resulted in numerous modifications of the database.

2.5 DEVELOPMENT OF USER'S MANUAL AND DATABASE DESIGN

Summit has prepared this user's manual and completed design modifications to the original database design. Summit will continue to provide ongoing support for future translations and for developing queries to analyse data stored in the fully-functional OBMEP database.

3.0 DATABASE DESIGN

The database design was developed in Microsoft Access (MS Access) 2003 version. The database design can be saved in earlier versions; however some of the features may not function properly in the earlier versions (e.g., switchboards, PivotChart View). MS Access databases are particularly flexible as the component database tables can be easily exported to other database applications, such as Microsoft Excel (.xls file) and Borland Paradox (.dbf file). In addition, MS Access is widely used and is often the software of choice for beginner and intermediate database users. Many of the database software systems that are designed to handle enormous quantities of data (e.g., Oracle) use MS Access as the user-interface software. Furthermore, in using MS Access, all information can be managed from a single database file (i.e., .mdb file).

The database was designed primarily as a data archiving system, to store similar data types and perform simple data analyses for reporting purposes. In order to design a database that most directly met the needs of CCT, output examples were reviewed and tested with the current design, using representative synthetic data.

The database is a relational database (i.e., the database consists of several tables that are linked together to facilitate retrieval of the data in a wide variety of ways). The purpose of defining relationships is to coordinate the retrieval of information in the different tables. The main advantage of a relational database is that queries, reports, and forms can be created to display information from several tables at once. Figure 3.1 summarizes the table relationships. The key variables that connect the tables within the database are Sample Number (SAMPLEID), and Site ID (SITEID).

The database has been assembled using eight (8) separate groups of tables, and the design is based on relationships linking each of the groups of tables. To simplify the table organization, the tables that are relationally connected to the MASTER SAMPLE table are labelled “ptbl” (permanent table) and the tables that are stand alone (but can be connected by DATE or SITEID to the other tables, but are stand alone are labelled “atbl” (alternate table).

The reason these tables (e.g., FLOW, TEMP) are stand-alone is because they consist of one data type (e.g., SITEID, DATE, TIME, TEMP) instead of multiple (for example the WQCHEMISTRY has many records for one SITEID, DATE, TIME). To create a one-to-many relationship with these "atbl" tables to the MASTER SAMPLE would make the database too cumbersome.

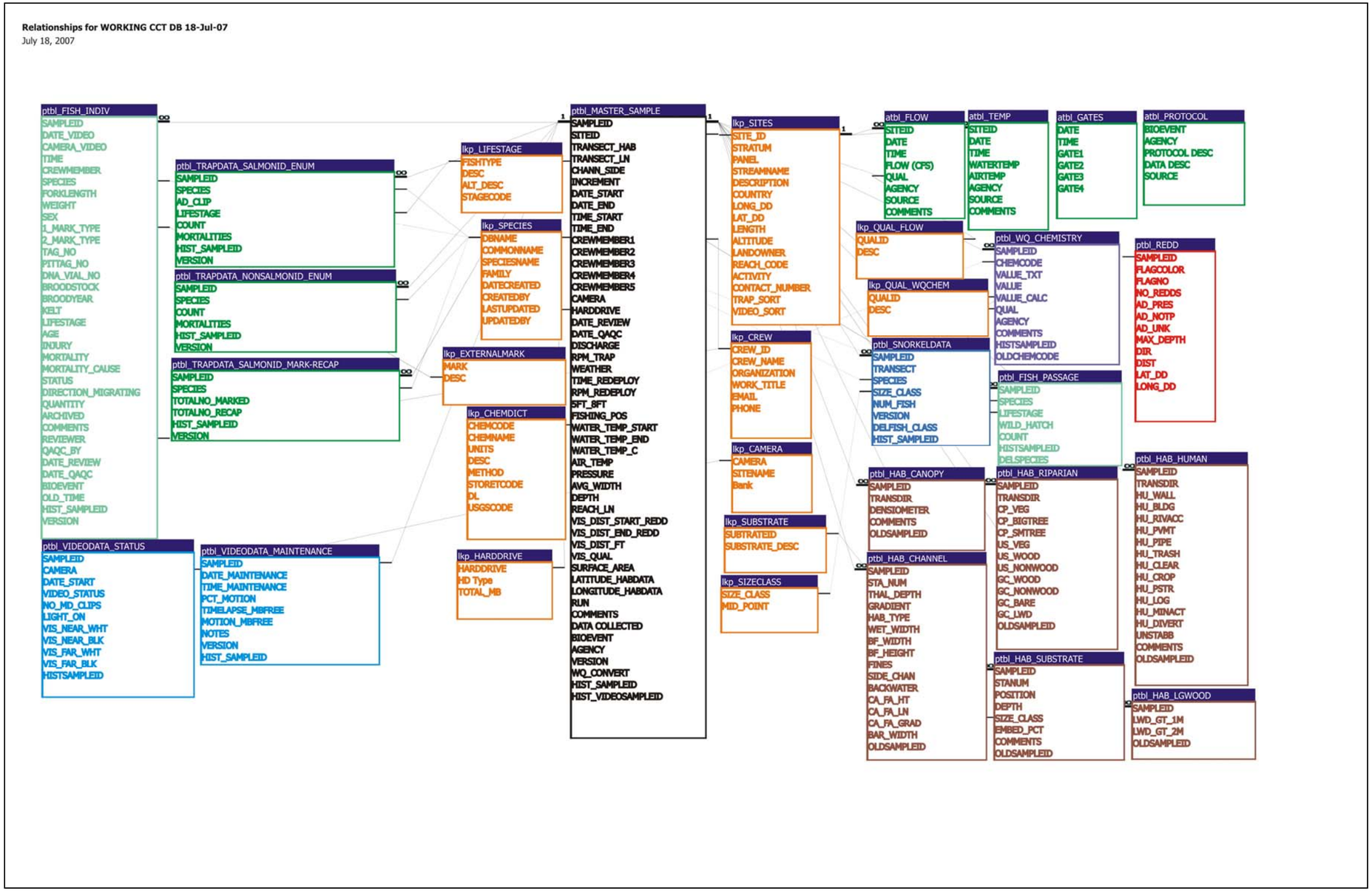
The eight groups of tables are as follows:

1. Individual Fish data (collected via VIDEO or TRAP);
2. Trap data;
3. Video data;
4. Water Quality Chemistry;
5. Snorkel data;
6. Redd data;
7. Fish Passage data; and
8. Habitat data.

These groups are presented in different colours in Figure 3.1.

The database design consists of 17 permanent data tables (prefix ptbl), 12 lookup tables (prefix lkp) and 4 alternate tables (prefix atbl). A detailed description of the database components is provided in Appendix A. This appendix includes a description of the database design, the content of each database table, and a description of the information contained in each of the fields that comprise the tables. Appendix B lists the standardized entries in the lookup tables (e.g., lkp_Chemdict, lkp_Sites).

Figure 3.1. Summary of the table relationships in the database design.



The MASTER SAMPLE is the "parent" table for all of the other "ptbl" tables in the database. The "ptbl" data tables are the tables that store the various types of data and the MASTER SAMPLE table contains relational fields (i.e., key variables) that remain consistent throughout the main tables of the database (e.g., SAMPLEID). It is important to use this table when creating and using queries, reports and forms as it keeps the database connected, thus making queries, reports and forms possible.

The database includes a user interface switchboard that enables beginner database users to open the entry forms even when they do not have experience with the database design. These forms open in a mode that allows for addition of new data.

4.0 DATABASE PROCEDURES

This section is intended to provide database users with instructions to support the entry and retrieval of information from the database using queries, reports and forms. The following sections will describe the pre-designed queries, reports and forms in the database design. In addition, this section will also outline procedures for the following:

- Using data entry forms;
- Running the pre-designed output queries, reports, and forms;
- Creating simple queries;
- Creating simple forms; and
- Exporting output queries, reports and forms for presentation.

4.1 DATA ENTRY FORMS

The current database design consists of four (4) data entry forms, listed in Table 4.1. To simplify data entry, the data entry forms were designed to mimic the current field forms used by the CCT field staff. Each of these data entry forms has the prefix "ENTRYFORM" for sorting purposes. The forms with the prefix "SubEntryForm" are subforms incorporated into complete data entry forms. Importantly, the sub entry forms have not been designed for

independent use and should not be opened. Examples of each data entry form are included on the CD that accompanies the protocol document.

The data entry forms include all tables in the database, and incorporate all relationships. Data should be entered into the database using these forms to ensure referential integrity. Data can also be entered into the tables directly without the use of the forms, or by using the excel templates (see the protocol document, under separate cover). However, it is very easy for the database user to make mistakes when entering data this way, therefore only very experienced database users should enter the data in this manner. Mistakes introduced into the database by these 'manual' data entry methods could prevent queries and/or reports from functioning properly. After incorporation of the data into the database, a thorough quality assurance/quality control (QA/QC) analysis should be performed to ensure referential integrity and data quality were maintained.

Table 4.1 List and description of the data entry forms.

Data Entry Form Name	**Description**
ENTRYFORM REDD DATA	Adds new redd data
ENTRYFORM SNORKEL DATA	Adds new snorkel data
ENTRYFORM TRAP DATA	Adds new trap data (salmonids, non-salmonids, and mark and recapture), includes a separate form for entering individual fish data
ENTRYFORM VIDEO DATA	Adds new video data, includes maintenance and status information and a separate form for entering individual fish data

4.2 PRE-DESIGNED OUTPUT QUERIES, REPORTS AND FORMS

The current database design consists of 70 pre-designed output queries, reports and forms, which were designed based on the examples of outputs for reporting provided by CCT staff. The following sections describe each of the pre-designed output queries, reports and forms.

4.2.1 Queries

Queries are used to view, change, and analyze data in different ways. The power of queries lies in being able to bring together or perform an action on data from more than one table in the database. The most common type of query is a select query. A select query retrieves data from one or more tables by using specified criteria and displays the data in a desired order (e.g., ascending order based on a data value). Other types of queries should only be used by very experienced database users, because they can permanently alter or delete information in the database.

The current database design consists of 66 pre-designed queries that were created exclusively for output, and are not included in other forms or reports. For reference, the original request for each of these queries is provided in Appendix C (e.g., Hillman request spreadsheet – often referred to as the "stoplight' spreadsheet). Each of these queries has the prefix "RLqry" and is numbered for sorting purposes (as per how each was requested) and is listed in Table 4.2. However, in the database design many other queries were created to perform analyses exclusively designed for pre-designed output forms and reports (prefix "qry"). These queries have not been designed for running independently and should not be run by themselves.

The following instructions outline the basic steps required to run a query once it is created (i.e., a pre-designed query):

1. Under **Objects** (on the left-hand side of the Database window), click **Queries**. The names of the pre-designed queries will be displayed in the Database window, and will have the prefix RLqry.
2. Double click on the pre-designed query of interest to view the results.
3. Once you have viewed the results, there are a few ways you can further analyse the data, as follows:
    - To print the data, Under **File**, select **Print Preview**. You may want to adjust the margins or the page orientation before sending to the printer. To adjust these

characteristics, click **File – Page Setup**. When you are ready to print, click **File – Print**.

- To copy and paste into Microsoft Excel, click **Edit – Select All Records**, then **Edit – Copy** and **Edit – Paste** into a new Microsoft Excel worksheet.

Note that you can sort the data in the window that you view the results in Microsoft Access, without importing into Excel.

Table 4.2 Pre-designed output queries

Query Name	Description
RLqry_01_SITEID_YEAR&BIOEVENT	
RLqry_02_REACHLN	
RLqry_03_WETTED WIDTH	
RLqry_04_WETTED SURFACE AREA by SITEID	
RLqry_04_WETTED SURFACE AREA by transect	
RLqry_05_PCT_SUBSTRATE	
RLqry_06_DOM_SUBSTRATE	
RLqry_07_AVG_EMBED	
RLqry_07_EMBEDDEDNESS	
RLqry_08_LWDperREACH	
RLqry_09_POOLPPperREACH	
RLqry_10_POOLBPperREACH	
RLqry_11_POOLTOTperREACH	
RLqry_12_POOLAVGDEPTH	
RLqry_13_FISHCOVER_PRESENT	
RLqry_14_SIDECHAN_BACKWAT_COUNT	
RLqry_15_BANKFULL DEPTH	
RLqry_15_BANKFULL DEPTH AVG, SD and COUNT	
RLqry_15_BANKFULL DEPTH AVG, SD and COUNT by year	
RLqry_15_BANKFULL DEPTH AVG, SD and COUNT by year	
RLqry_15_BANKFULL DEPTH by year	
RLqry_15_BANKFULL DEPTH CI	
RLqry_15_BANKFULL DEPTH CI by year	
RLqry_16_BANKFULLWIDTH AND THALWEG DEPTH	
RLqry_17_BANKFULLWIDTH-DEPTH RATIO	
RLqry_18_CANOPYVEG	
RLqry_19_HUMINACT_COUNT	
RLqry_20_HUDIVERT_COUNT	
RLqry_20_HULOG_COUNT	
RLqry_21_HUPSTR_COUNT	
RLqry_22_HUCROP_COUNT	
RLqry_23_HUWALL_COUNT	
RLqry_24_HUBLDG_COUNT	
RLqry_25_HUPIPE_COUNT	
RLqry_26_HUCLEAR_COUNT	
RLqry_27_HUTRASH_COUNT	
RLqry_28_HUPVMT_COUNT	
RLqry_29_HURIVACC_COUNT	
RLqry_30_DENSIOMETER	
RLqry_31_SpCounts_FISH_PASSAGE	
RLqry_31_SpCounts_SNORKEL	
RLqry_31_SpCounts_TRAP_NONSAL_ENUM	
RLqry_31_SpCounts_TRAP_SAL_ENUM	
RLqry_31_SpCounts_VIDEO	
RLqry_31_SPRich_FISH_PASSAGE	
RLqry_31_SPRich_SNORKEL	
RLqry_31_SPRich_TRAP_NONSAL_ENUM	
RLqry_31_SPRich_TRAP_SAL_ENUM	
RLqry_31_SPRich_VIDEO	
RLqry_32_FISHDENSITYperWETTED_SURFACE_AREA	
RLqry_A_WATERYEAR_FLOW	
RLqry_A_WATERYEAR_FLOW check	
RLqry_A_WATERYEAR_FLOW_Crosstab	
RLqry_A_WATERYEAR_FLOW_Crosstab 365 days	
RLqry_B_WATERYEAR_TEMP	
RLqry_B_WATERYEAR_TEMP check	
RLqry_B_WATERYEAR_TEMP_Crosstab	
RLqry_C_WATERYEAR_WQ	
RLqry_C_WATERYEAR_WQ check	
RLqry_C_WATERYEAR_WQ-enterchemcode_Crosstab	
RLqry_C_WATERYEAR_WQ-nochemcode	
RLqry_C_WATERYEAR_WQ-nochemcode check	
RLqry_C_WATERYEAR_WQ-nochemcode_Crosstab	
RLqry_CONVERTDATE_UNIVFORMAT	
RLqry_D_FLOW_MOVINGAVG	
RLqry_D_FLOW_WATERYEAR_AVGMINMAX	
RLqry_J__SpCounts_TRAP_NONSAL_ENUM_trapping period	
RLqry_K_TIMEDIFF	

4.2.2 Reports

Reports are used to summarize the data in tables or calculated in queries. The current database consists of xxx pre-designed output reports. Each of these reports has the prefix "REPORT" and is listed in Table 4.3.

Table 4.3 Pre-designed output reports

Report Name	Description
X	
X	
X	

The following instructions outline the basic steps required to run a report once it is created (i.e., a pre-designed report):

1. Under **Objects** (on the left-hand side of the Database window), click **Reports**. The names of the pre-designed reports will be displayed in the Database window.
2. Double click on the pre-designed report of interest to view or print the results.

4.2.3 Forms

As mentioned in Section 4.1, forms in a database can be used for data entry and are an easy way to review the relational data. However, forms can also be used to graph/chart the data for reporting. The current database design consists of four (4) charting forms (graphs). Each of these forms has the prefix "CHART or PIVOTCHART" for sorting purposes and is listed in Table 4.4.

The following instructions outline the basic steps required to open a form once it is created (i.e., a pre-designed form):

1. Under **Objects** (on the left-hand side of the Database window), click **Forms**. The names of the pre-designed form will be displayed in the Database window.
2. Double click on the pre-designed form of interest to view the results.

Table 4.4 Pre-designed charting output forms (graphs).

Form Name	**Description**
CHART_D_FLOW_AVG MIN MAX	
CHART_D_FLOW_MOVINGAVG	
PIVOTCHART_VIDEO BY HOUR	
PIVOTCHART_VIDEO BY MONTH	

Note that these charting forms are interactive and the database user can switch from the entry form style to a charting style by clicking **View** and selecting a different view from the drop-down list (e.g., PivotChart View, Form View). The chart type can also be modified. In addition, the user can modify the way the data is grouped in the charts using the following instructions

1. Right click the desired field in the chart and choose **Properties**.
2. Under the **Filter and Group tab**, choose from the **Group Items By** drop-down list various grouping options (e.g., sampling date by month or by year).

Using this same method, intervals can also be selected to analyse a specific sub-sample of the data (e.g., only 2004 data).

4.3 CREATING SIMPLE QUERIES

The following instructions outline the basic steps required to create a select query, in query Design View.

1. Under **Objects** (on the left-hand side of the Database window), click **Queries**.
2. Click **New** (top of the Database window).
3. In the **New Query** window select **Design View**, then **OK**.
4. Select the data you want to work with by adding the tables or queries that contain the data of interest (in the Show Table window, select tables and/or queries, then **Add**). Once you have added the tables you are interested in querying, press the **Close** button in the Show Table window. Note: If you accidentally close the

'Show Table' window, you may bring it back by choosing the 'Query' menu, and choosing 'Show Table…'

5. The query is completed by filling in the design grid, as follows:
   a. To add a field to the design grid, drag the field from the field list to a column in the design grid, or double-click the field name in the field list (to remove a field from the design grid, click the column selector to highlight the column, and then press the **Delete** key);
   b. To sort records in the query results, click in the **Sort** cell for the field you want to sort, click the arrow, and then select a sort order from the drop-down list (e.g., ascending);
   c. To limit the records that you see in the query's results, specify criteria in the **Criteria** row for one or more fields (e.g., to include only Chinook enter "*Chinook*"). The * (asterisk) is a wildcard symbol and can be used to search for partial words (e.g. *Chi* would find 'Chinook' *and* 'Chicago'); and,
   d. To perform calculations on the values in a field, click **Totals** on the toolbar (Sum icon; or select **Totals** from the **View** menu) to display the **Total** row in the design grid, click the arrow, and then select a function by using the drop-down list (e.g., sum, average, etc.). Note: When you add Totals to your query, all fields will automatically be grouped by unique entries for each calculation.
6. View the results of the query by clicking the **Run** button (exclamation mark icon) on the toolbar, or select **Datasheet View** from the **View** menu.

For more information on queries refer to the MS Office Access Help under the **Help** menu.

4.4 CREATING PIVOT CHART FORMS (GRAPHS)

Pivot Chart forms are the most interactive way a database user can analyse data. The user can manipulate the way the data is grouped and can modify the way the data is presented without having to understand SQL (Structured Query Language) statements or modify the

design of the form. The following instructions outline the basic steps required to create Pivot Chart forms.

1. Under **Objects** (on the left-hand side of the Database window), click **Forms**.
2. Click **New** (top of the Database window).
3. In the **New Form** window select **AutoForm: PivotChart**, then choose the table or query that contains the data of interest from the drop down list and click **OK**.
4. Highlight the fields you are interested in for each axis and drag them to the appropriate spot on the chart. In addition, the user can modify the way the data is grouped by following the instructions provided in Section 4.2.

4.5 EXPORTING OUTPUT QUERIES, REPORTS AND FORMS

As described above, Pivot Chart forms are the most interactive way a database user can analyse data. However, Pivot Chart forms cannot be electronically exported into other software applications. The only way these charts can be exported is by using Adobe Acrobat software to print the image to a file. Reports on the other hand, can be exported to Snapshot format (.snp), which retains the graphics and formatting of the report. However, the best way to export reports is also using Adobe Acrobat software to print the image to a file.

Once the desired image has been printed to Adobe Acrobat format (.pdf), the image can be manipulated (i.e., text added or changed) using Adobe Acrobat software or saved as a jpeg or png image, which is easily inserted into Microsoft Word. There is also other software available which allows for more detailed manipulations of pdf files (e.g., merging, rotating of images), such as Adobe Photoshop.

5.0 DATABASE SECURITY

Microsoft Access has user-security measures for protection of the database. Implementing these measures can control the level of access different users to the database. For example, permissions could be set up such that the 'default' user (i.e. anyone), who may not be familiar with the database would only have access to select queries, reports and forms and

would not be able to modify any of the database design or contents. More advanced users would enter their unique password in order to be able to modify the database design or contents.

To enable User-Security on the database file currently on your computer (server), follow the directions under **Tools – Security – User-Level Security Wizard**.

For more information on user-security measures refer to the MS Office Access Help under the **Help** menu.

6.0 DATABASE LIMITATIONS

Using MS Access presents some challenges to the database user. Database users must be forewarned that all changes to the database are permanent and cannot be reversed using 'Undo' commands (e.g., deleting a table, deleting a record, updating information in a cell, etc.). Because of this, care must be taken when working with the database tables. Caution is also needed when exporting the data into other applications. For example, MS Access and MS Excel often interpret formatted text in slightly different ways, which can result in errors when exporting or importing data (e.g., text formatted as a date in MS Excel is imported into MS Access as a string of meaningless numbers). Therefore, it is recommended that the database be backed up *prior to* importing large amounts of data, and that checks be conducted after the data is imported to ensure that data quality has been maintained (e.g., date format, number of fields, number of records). In this way, if 'bad' data is imported, it is possible to 'undo' the changes by reverting to the backed-up copy. The same checks should be employed when exporting data, to ensure that the exported product is correctly formatted, and contains the correct information.

Database users need to be familiar with the database design and field definitions to enable them to design effective queries. It is therefore necessary for database users to thoroughly

review the supporting documentation prior to designing queries, modifying existing data, and/or adding data to the database.

Additional limitations with MS Access databases are:

- Text field only allow a maximum of 255 characters. If more characters are required, the field type can be modified (from "text" to "memo" field type).
- Times will be stored according to 24-hour clock (i.e., short time field type).
- Dates will be stored in "medium date" format (e.g., 25-July-05).
- The limnological results will be stored as text and again as numbers. This ensures that significant figures and qualifiers are retained in the text field, while the number field allows numerical calculations to be performed.

7.0 TROUBLESHOOTING

While the database is in operation (e.g., entering data, running and creating queries, reports and forms), temporary hidden objects are automatically created. These temporary objects are not visible to the database user; however the existence of these tables can expand the size of the database file, causing the database to run at slower than optimal performance. To remove these temporary tables, the user should use the **Compact and Repair** utility found under **Tools** menu, click **Database Utilities** and then click **Compact and Repair Database.** Note that this utility will not function when the database is being shared among two or more users. I recommend running the Compact and Repair utility weekly, and make a backup copy prior to compacting.

8.0 QUALITY ASSURANCE/QUALITY CONTROL

It is important to understand how data quality is maintained through standardized QA/QC procedures. The first step in the QA/QC process involves verifying the data against the original data source. Following translation of the data into the database, the verified data

should be further audited. Pre-import backup copies of the database should not be discarded until this verification is complete. This auditing process involves analyses of outliers (e.g., to identify potential inconsistencies with units) and completeness (e.g., to identify missing samples or missing data); and, checking sample identification numbers (e.g., to ensure that data were not duplicated). The auditing process should be regarded as a part of data entry, and should not be put off or left, even overnight. If another person begins adding to the database after new data is imported but before it is checked, and it turns out that data did not import correctly, the backup copy will no longer be current, and the current copy will contain errors. Never begin a data import unless there is adequate time to complete the QA/QC stage immediately afterwards.

In general, auditing the database includes the following analyses:

- Check all parent-to-child (one-to-many) relationships to ensure the relationships are working appropriately;
- Ensure that the same number of records has been added as existed in the original data;
- Sum imported numeric data in a query, and check the totals against the original data;
- Ensure that new data can be 'seen' by reports and queries as expected;
- Perform unique queries on all fields to identify outliers;
- Perform min-max queries on all fields to identify outliers; and
- Perform duplicate queries to check for duplicate entries.

Any suspicious values should be checked against original documentation. Any changes that are made manually as a result of the checking should be double-checked by a second auditor.

APPENDIX A

Table and Field Descriptions.

ptbl_MASTER_SAMPLE		
SAMPLEID	Long Integer	Biological Sampling Event ID
SITEID	Text	SiteID (lkp_SITES, sorted by Traps)
TRANSECT_HAB	Text	Transect (for Habitat Data only) A-B;B-C;C-D;D-E,E-F,F-G,H-I;I-J;K Side channel data is denoted with an "X" AB;BX;CX;DX;EX;FX;GX;HX;IX;JX;KX
TRANSECT_LN	Text	Transect Length (for Habitat Data)
CHANN_SIDE	Text	Channel or Side Channel
INCREMENT	Double	Spacing between thalweg measurements (meters); for Habitat Data
DATE_START	Date/Time	Start Date (dd-mmm-yy)
DATE_END	Date/Time	End Date (dd-mmm-yy)
TIME_START	Date/Time	Start Time (24 hour)
TIME_END	Date/Time	Stop Time (24 hour)
CREWMEMBER1	Text	Crew Member (lkp_CREW)
CREWMEMBER2	Text	Crew Member (lkp_CREW)
CREWMEMBER3	Text	Crew Member (lkp_CREW)
CREWMEMBER4	Text	Crew Member (lkp_CREW)
CREWMEMBER5	Text	Crew Member (lkp_CREW)
CAMERA	Long Integer	Camera Number (sorted by SITENAME)
HARDDRIVE	Double	Hard Drive (lkp_HARDDRIVE)
DATE_REVIEW	Date/Time	Date Reviewed (dd-mmm-yy)
DATE_QAQC	Date/Time	Date of QAQC (dd-mmm-yy))
DISCHARGE	Text	Discharge (CFS)
RPM_TRAP	Double	Trap RPM at Start
WEATHER	Text	Weather
TIME_REDEPLOY	Date/Time	Redeploy Start Time
RPM_REDEPLOY	Double	Redeploy RPM
5FT_8FT	Text	8 foot or 5 foot
FISHING_POS	Long Integer	Fishing Position (1 or 2)
WATER_TEMP_START	Double	Start Water Temperature (F).
WATER_TEMP_END	Double	End Water Temperature (F).
WATER_TEMP_C	Double	Water Temperature (C)
AIR_TEMP	Text	Air Temperature (C)
PRESSURE	Text	Barometric pressure, millimeters of mercury
AVG_WIDTH	Single	Average width of stream at site, in feet.
DEPTH	Text	Depth of water sample (USGS chemistry)
REACH_LN	Text	HABITAT: Length of entire sample reach from transect A through transect K (meters). USGS WQ: Location in cross section, distance from left bank looking downstream, feet
VIS_DIST_START_REDD	Text	Visibility, in meters at the start of the redd survey
VIS_DIST_END_REDD	Text	Visibility, in meters at the end of the redd survey
VIS_DIST_FT	Single	Visibility at site, in feet.
VIS_QUAL	Text	Visibility (Poor;Fair;Good).
SURFACE_AREA	Text	Surface area, square miles
LATITUDE_HABDATA	Text	Latitude (Habitat Data - Individual transects)
LONGITUDE_HABDATA	Text	Longitude (Habitat Data - Individual transects)
RUN	Text	Run (Fish passage data; SPRING, SUMMER, FALL)
COMMENTS	Text	Comments
DATA COLLECTED	Yes/No	Data Collected? (Yes or No)
BIOEVENT	Text	BioEvent (SNORKEL; TRAP; VIDEO; FISH PASSAGE; HOURLY TEMP; WATER QUALITY;REDD)
AGENCY	Text	Agency (DOE; CCT; WELLS DAM; BOXCAR)
VERSION	Text	
WQ_CONVERT	Double	USGS Water Quality - Conversion Factor
HIST_SAMPLEID	Long Integer	
HIST_VIDEOSAMPLEID	Long Integer	
see lkp_SITES, lkp_CREW, lkp_HARDDRIVE		

ptbl_HAB_CANOPY		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
TRANSDIR	Text	Position on transect (CU=Center facing up, CL=Center facing left; CD=Center facing down; CR=Center facing right; LB=Left Bank; RB=Right Bank).
DENSIOMETER	Integer	Number of cross-hairs upon which shade falls (0-17)
COMMENTS	Text	Comments including descriptors for qualifiers.
OLDSAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
ptbl_HAB_CHANNEL		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
STA_NUM	Double	Thalweg depth position between transects; There are 10 (Stations 0 through 9). Station 0 occurs at the associated transect. Station 9 occurs 1 increment lower than the next transect.
THAL_DEPTH	Double	Wetted depth of the estimated thalweg (cm).
GRADIENT	Double	Gradient (Slope_Hor)
HAB_TYPE	Text	Habitat type: GL=Glide; PT=Pool Tailout; BP=Beaver Pond; DRY=Dry;PP=Primary Pool; LCR=Large Cobble/Boulder Riffle; SCR=Small Cobble/Gravel Riffle; RA=Rapid; CF=Cascade/Falls;
WET_WIDTH	Double	Wetted width (meters); -99.9 means "not applicable".
BF_WIDTH	Double	Bankfull width (meters); -99.9 means "not applicable".
BF_HEIGHT	Double	Bankfull height (meters); -99.9 means "not applicable".
FINES	Text	Fines (Yes/No)
SIDE_CHAN	Text	Side channels (Yes/No)
BACKWATER	Text	Backwaters (Yes/No)
CA_FA_HT	Double	Cascade/Falls - Height
CA_FA_LN	Double	Cascade/Falls - Length
CA_FA_GRAD	Double	Cascade/Falls - Gradient
BAR_WIDTH	Double	Width of bar (meters)
OLDSAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
ptbl_HAB_HUMAN		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
TRANSDIR	Text	Transect direction (LB=Left =Bank plot; RB=Right Bank plot)
HU_WALL	Text	Presence/proximity of HUMAN INFLUENCE (Wall/Revetment/Riprap/Dam): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_BLDG	Text	Presence/proximity of HUMAN INFLUENCE (Buildings): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_RIVACC	Text	Presence/proximity of HUMAN INFLUENCE (River Access Sites): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_PVMT	Text	Presence/proximity of HUMAN INFLUENCE (Pavement/Cleared Lot): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_PIPE	Text	Presence/proximity of HUMAN INFLUENCE (Pipes as inlet or outlet): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_TRASH	Text	Presence/proximity of HUMAN INFLUENCE (Garbage/Landfill/Trash): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_CLEAR	Text	Presence/proximity of HUMAN INFLUENCE (Cleared Lot/Park/Lawn): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_CROP	Text	Presence/proximity of HUMAN INFLUENCE (Orchards/Row Crops): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_PSTR	Text	Presence/proximity of HUMAN INFLUENCE (Pasture/Range/Hay Field): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_LOG	Text	Presence/proximity of HUMAN INFLUENCE (Logging Operations): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_MINACT	Text	Presence/proximity of HUMAN INFLUENCE (Mining Activity): O=Not present , P=>10m, C=Within 10m, B=On bank.
HU_DIVERT	Text	Presence/proximity of HUMAN INFLUENCE (Diversion): O=Not present , P=>10m, C=Within 10m, B=On bank.

UNSTABB	Long Integer	Percentage of 10 m length of bank (at bankfull stage) at each transect that appears unstable due to breakdown, slumping, cracking, or bare/steep surfaces. -999 = missing data.
COMMENTS	Text	Descriptors for qualifiers and general comments
OLDSAMPLEID	Long Integer	
ptbl_HAB_LGWOOD		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
LWD_GT_1M	Double	Large woody debris greater than 1m
LWD_GT_2M	Double	Large woody debris greater than 2m
OLDSAMPLEID	Long Integer	
ptbl_HAB_RIPARIAN		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
TRANSDIR	Text	Transect direction (LB=Left Bank plot; RB=Right Bank plot)
CP_VEG	Text	Canopy Vegetation type (Deciduous, Coniferous, Evergreen (broadleaf), Mixed, or None)
CP_BIGTREE	Double	Proportion of canopy cover from BIG TREES (>0.3m DBH); 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
CP_SMTREE	Double	Proportion of canopy cover from SMALL TREES (<0.3m DBH);0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
US_VEG	Text	Understory Vegetation type (Deciduous, Coniferous, Evergreen (broadleaf), Mixed, or None)
US_WOOD	Double	Proportion of UNDERSTORY as WOODY Shrubs and saplings; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
US_NONWOOD	Double	Proportion of UNDERSTORY as NON-WOODY Herbs, grasses and forbs; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
GC_WOOD	Double	Proportion of GROUNDCOVER as WOODY Shrubs and saplings; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
GC_NONWOOD	Double	Proportion of GROUNDCOVER as NON-WOODY Herbs, grasses and forbs; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
GC_BARE	Double	Proportion of GROUNDCOVER as BARE; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
GC_LWD	Double	Proportion of GROUNDCOVER as LWD; 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%).
OLDSAMPLEID	Long Integer	
ptbl_HAB_SUBSTRATE		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
STANUM	Text	
POSITION	Text	Position on transect. L= Left bankfull stage; LC=left of center; C=center; RC=right of center; R=right bankfull stage.
DEPTH	Double	
SIZE_CLASS	Text	Size class code of particle (RS=Bedrock smooth; RR=Bedrock, BL=Boulder, LCB=Large Cobble, SCB=Cobble (tennis to softball), GC=Coarse Gravel, GF=Fine Gravel, SA=Sand, FN=Silt/Clay/Much, HP=Hardpan, WD=Wood, OT=Other (lkp_SUBSTRATE)
EMBED_PCT	Double	Estimated embeddedness of particle (0-100%)
COMMENTS	Text	Descriptions for qualifiers.
OLDSAMPLEID	Long Integer	
see lkp_SUBSTRATE		

ptbl_WQ_CHEMISTRY		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER SAMPLE)
CHEMCODE	Text	CHEMCODE (lkp_CHEMDICT)
VALUE_TXT	Text	Value (Text field for making tables - includes qualifiers)
VALUE	Double	Value (Number field)
VALUE_CALC	Double	Value (Use this for calculations, negative turbidity are zeros)
QUAL	Text	Qualifiers (lkp_QUAL_WQCHEM)
AGENCY	Text	Agency (DOE, CCT)
COMMENTS	Text	Comments
HISTSAMPLEID	Double	
OLDCHEMCODE	Text	
see lkp_CHEMDICT, lkp_QUAL_WQCHEM		

ptbl_FISH_INDIV		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
DATE_VIDEO	Date/Time	Date of the Video Observance
CAMERA_VIDEO	Long Integer	Camera Number (sorted by SITENAME) for Video Data
TIME	Long Integer	Time fish collected (24hr)
CREWMEMBER	Text	Initials of Biosampler
SPECIES	Text	Species (lkp_SPECIES)
FORKLENGTH	Double	Fork Length (mm)
WEIGHT	Double	Weight (g)
SEX	Text	Sex of fish (Male; Female; Unknown)
1_MARK_TYPE	Text	Primary Mark (lkp_EXTERNALMARK)
2_MARK_TYPE	Text	Secondary Mark (lkp_EXTERNALMARK)
TAG_NO	Text	Tag Number
PITTAG_NO	Text	PitTag Number
DNA_VIAL_NO	Text	DNA Vial #
BROODSTOCK	Yes/No	Broodstock (Yes/No)
BROODYEAR	Text	Broodyear
KELT	Yes/No	Kelt (Yes/No)
LIFESTAGE	Text	Fish type (mortalities, smolts, juvenile, YOY, adults) (lkp_LIFESTAGE)
AGE	Long Integer	Age
INJURY	Yes/No	Injury (Yes/No)
MORTALITY	Yes/No	Mortality (Yes/No)
MORTALITY_CAUSE	Text	Cause of Mortality
STATUS	Text	Status: Trasported to hatchery for broodstock (TH), Passed upstream (PU), Passed Downstream (PD)
DIRECTION_MIGRATING	Text	Direction Migrating (Upstream; Downstream)
QUANTITY	Long Integer	Quantity (default of 1)
ARCHIVED	Yes/No	Was this motion clip archived?
COMMENTS	Text	Comments
REVIEWER	Text	Crew Member
QAQC_BY	Text	Crew Member
DATE_REVIEW	Date/Time	Date Reviewed (dd-mmm-yy)
DATE_QAQC	Date/Time	Date of QAQC (dd-mmm-yy)
BIOEVENT	Text	Bioevent (VIDEO, TRAP)
OLD_TIME	Date/Time	Time fish collected (24hr) - includes minutes
HIST_SAMPLEID	Long Integer	
VERSION	Text	
see lkp_EXTERNAL MARK, lkp_LIFESTAGE, lkp_SPECIES		

ptbl_FISH_PASSAGE		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER SAMPLE)
SPECIES	Text	Species (lkp_SPECIES)
LIFESTAGE	Text	LifeStage (lkp_LIFESTAGE) for Chinook and Coho
WILD_HATCH	Text	Wild or Hatchery (SteelHead only)
COUNT	Long Integer	Count of Fish
HISTSAMPLEID	Double	
DELSPECIES	Text	
see lkp_SPECIES, lkp_LIFESTAGE		

ptbl_REDD		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
FLAGCOLOR	Text	Color of flagging used to mark new redds in the current survey
FLAGNO	Long Integer	Start numbering at one and number each redd equentially as you survey the reach
NO_REDDS	Long Integer	Number of redds seen at this location
AD_PRES	Long Integer	Number of fish with an adipose fin
AD_NOTP	Long Integer	Number of fish without an adipose fin
AD_UNK	Long Integer	Number of fish that you can't tell if they have an adipose fin or not
MAX_DEPTH	Long Integer	Maximum vertical depth at the deepest redd observation
DIR	Text	Cardinal direction from the flag to the redd or group of redds (N, NE, NW, S, SE, SW, E, W)
DIST	Long Integer	Distance (m) from the flag to the redd or group of redds
LAT_DD	Double	Latitude, Decimal Degrees
LONG_DD	Double	Longitude, Decimal Degrees

ptbl_TRAPDATA_NONSALMONID_ENUM		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
SPECIES	Text	Species (lkp_SPECIES)
COUNT	Long Integer	Count
MORTALITIES	Long Integer	Number of Mortalities
HIST_SAMPLEID	Long Integer	
VERSION	Text	
ptbl_TRAPDATA_SALMONID_ENUM		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
SPECIES	Text	Species (lkp_SPECIES)
AD_CLIP	Yes/No	AD Clipped (Yes/No)
LIFESTAGE	Text	Life Stage (lkp_LIFESTAGE)
COUNT	Long Integer	Count of individuals of each FISH TYPE
MORTALITIES	Long Integer	Number of Mortalities
HIST_SAMPLEID	Long Integer	
VERSION	Text	
ptbl_TRAPDATA_SALMONID_MARK-RECAP		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
SPECIES	Text	Species (lkp_SPECIES)
TOTALNO_MARKED	Long Integer	Total Marked (i.e., dyed)
TOTALNO_RECAP	Long Integer	Total Recaptured
HIST_SAMPLEID	Long Integer	
VERSION	Text	
see lkp_LIFESTAGE, lkp_SPECIES		
also see ptbl_INDIVIDUAL FISH DATA		

ptbl_SNORKELDATA	
SAMPLEID	Long Integer
TRANSECT	Text
SPECIES	Text
SIZE_CLASS	Text
NUM_FISH	Integer
VERSION	Text
DELFISH_CLASS	Text
HIST_SAMPLEID	Long Integer
see lkp_SIZECLASS, lkp_SPECIES	

SampleID (ptbl_MASTER_SAMPLE)
Transect A-K
Species (lkp_SPECIES)
Descriptive size range (lkp_SIZECLASS - <100mm; 100-300mm; >300mm).
Number of fish counted.

ptbl_VIDEODATA_MAINTENANCE		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
DATE_MAINTENANCE	Date/Time	Date of Maintenance
TIME_MAINTENANCE	Long Integer	Time of Mainenance (hourly)
PCT_MOTION	Double	Percent Motion Detection Partition
TIMELAPSE_MBFREE	Long Integer	Time-Lapse MBytes Free
MOTION_MBFREE	Long Integer	Motion MBytes Free
NOTES	Text	Notes
VERSION	Text	
HIST_SAMPLEID	Long Integer	
ptbl_VIDEODATA_STATUS		
SAMPLEID	Long Integer	SampleID (ptbl_MASTER_SAMPLE)
CAMERA	Long Integer	Camera (lkp_CAMERA)
DATE_START	Date/Time	Start Date (dd-mmm-yy)
VIDEO_STATUS	Text	Video Status (Complete or Partial)
NO_MD_CLIPS	Double	Number of MD Clips Reviewed
LIGHT_ON	Yes/No	Light On or Off
VIS_NEAR_WHT	Yes/No	Visibility White: Near
VIS_NEAR_BLK	Yes/No	Visibility Black: Near
VIS_FAR_WHT	Yes/No	Visibility White: Far
VIS_FAR_BLK	Yes/No	Visibility Black: Far
HISTSAMPLEID	Long Integer	
see lkp_CAMERA		
also see ptbl_INDIVIDUAL FISH DATA		

atbl_FLOW		
SITEID		SiteID (lkp_SITES)
DATE	Date/Time	Start Date (dd-mmm-yy)
TIME	Date/Time	Start Time (24 hour)
FLOW (CFS)	Double	Flow (CFS)
QUAL	Text	Qualifier (lkp_QUAL_FLOW)
AGENCY	Text	Agency (CCT-ET; DOE; ENVIRONMENT CANADA; USGS)
SOURCE	Text	
COMMENTS	Text	
see lkp_SITES, lkp_QUAL_FLOW		

atbl_TEMP		
SITEID	Text	SiteID (lkp_SITES)
DATE	Date/Time	Date (dd-mmm-yy)
TIME	Date/Time	Time (24 hour)
WATERTEMP	Double	Water Temperature (deg C)
AIRTEMP	Double	Air Temperature (deg C)
AGENCY	Text	Agency (CCT; DOE; ENVIRONMENT CANADA; USGS)
SOURCE	Text	
COMMENTS	Text	
see lkp_SITES		

atbl_GATES		
DATE	Date/Time	Date (dd-mmm-yy)
TIME	Date/Time	Time (24 hour)
GATE1	Long Integer	
GATE2	Long Integer	
GATE3	Long Integer	
GATE4	Long Integer	

atbl_PROTOCOL								
BIOEVENT	Text	BioEvent (SNORKEL; TRAP; VIDEO; FISH PASSAGE; HOURLY TEMP; WATER QUALITY; FLOWDATA; REDD)						
AGENCY	Text	Agency (WELLS DAM; BOXCAR; DOE; CCT; USGS; ENVIRONMENT CANADA)						
PROTOCOL DESC	Text							
DATA DESC	Text	Description of Data						
SOURCE	Text	Data Source						

lkp_CAMERA		
CAMERA	Long Integer	CAMERA
SITENAME	Text	SITENAME (lkp_SITES)
Bank	Text	Bank
lkp_CHEMDICT		
CHEMCODE	Text	CHEMCODE
CHEMNAME	Text	Chemical Name
UNITS	Text	Units
DESC	Text	Description
METHOD	Text	Method
STORETCODE	Text	Storet Code
DL	Text	Detection Limit
USGSCODE	Text	USGS Code
lkp_CREW		
CREW_ID	Text	Unique 2-Digit Initials of Sampling Crew (use 3 if needed)
CREW_NAME	Text	Full Name of Crew Member
ORGANIZATION	Text	Name of Organization Crew Member is affiliated with.
WORK_TITLE	Text	Work Title of Crew Member (Ex: Fisheries Technician I)
EMAIL	Text	E-Mail Address
PHONE	Text	Phone Number
lkp_EXTERNALMARK		
MARK	Text	External Mark (AD; CA; EL; FL; JT; LV; OT; PC; RV; TR; UM; UN)
DESC	Text	Description
lkp_HARDDRIVE		
HARDDRIVE	Double	HardDrive Number
HD Type	Text	HardDrive Type
TOTAL_MB	Long Integer	Total MBytes on Drive
lkp_LIFESTAGE		
FISHTYPE	Text	ADULT; ALEVIN; FRY; JUVENILE; PARR; SMOLT
DESC	Text	Description
ALT_DESC	Text	Alternate description
STAGECODE	Text	Stagecode
lkp_QUAL_FLOW		
QUALID	Text	Qualifier (ptbl_WQ_CHEMISTRY)
DESC	Text	Description of Qualifier
lkp_QUAL_WQCHEM		
QUALID	Text	Qualifier (ptbl_WQ_CHEMISTRY)
DESC	Text	Description of Qualifier
lkp_SITES		
SITE_ID	Text	Site identifier assigned to each site - 'OBMEP-' plus 3-digit site number.
STRATUM	Text	Strata used in the survey design.
PANEL	Text	Identifies Base sample by panel number and Oversample by OverSamp
STREAMNAME	Text	Name associated with the site
DESCRIPTION	Text	Site description provided by CCT crew
COUNTRY	Text	Country - USA or Canada
LONG_DD	Double	Longitude, Decimal Degrees

LAT_DD	Double	Latitude, Decimal Degrees
LENGTH	Double	Length of Site
ALTITUDE	Double	Altitude of land surface, feet
LANDOWNER	Text	Landowner
REACH_CODE	Text	Reach Code
ACTIVITY	Text	Activity
CONTACT_NUMBER	Text	Contact Number
TRAP_SORT	Long Integer	
VIDEO_SORT	Long Integer	
SNORKEL_SORT	Long Integer	
REDD_SORT	Long Integer	
RLENTRY	Text	
lkp_SIZECLASS		
SIZE_CLASS	Text	Size class (<100mm; >300mm; 100-300mm)
MID_POINT	Long Integer	Mid point (use for calculations)
lkp_SPECIES		
DBNAME	Text	Unique species name used in the database
COMMONNAME	Text	Common name
SPECIESNAME	Text	Species (Scientific Name)
FAMILY	Text	Family
DATECREATED	Text	
CREATEDBY	Text	
LASTUPDATED	Text	
UPDATEDBY	Text	
VIDEO_SORT	Long Integer	
lkp_SUBSTRATE		
SUBTRATEID	Text	BL; FN; GC; GF; HP; LCB; OT; RR; RS; SA; SCB; WD
SUBSTRATE_DESC	Text	Description

APPENDIX B

Entries in the Lookup Tables.

Appendix B. Entries in the Lookup Tables

lkp_CAMERA

CAMERA	SITENAME	Bank
-9		
1	OBMEP-ZOSEL	Left
2	OBMEP-ZOSEL	Left
3	OBMEP-ZOSEL	Left
4	OBMEP-ZOSEL	Left
5	OBMEP-ZOSEL	Right
6	OBMEP-ZOSEL	Right
7	OBMEP-ZOSEL	Right
8	OBMEP-ZOSEL	Right
17	BONAVS	

lkp_CHEMDICT							
CHEMCODE	**CHEMNAME**	**UNITS**	**DESC**	**METHOD**	**ORETCO**	**DL**	**USGSCODE**
ACID_FIX_FIELD		mg/L	Acid neutralizing capacity, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams per liter as calcium carbonate				p00410
ACID_FIX_LAB		mg/L	Acid neutralizing capacity, water, unfiltered, fixed endpoint (pH 4.5) titration, laboratory, milligrams per liter as calcium carbonate				p90410
ACID_TITR		mg/L	Acid neutralizing capacity, water, unfiltered, incremental titration, field, milligrams per liter as calcium carbonate				p00419
ACNANTHES			ACHNANTHES (4) USGS,ACL				p96777
Ag_DIS	Silver, Dissolved	ug/L		EPA200.8		0	
Ag_TR	Silver, Tot Rec	ug/L		EPA200.8		0	
AGMENELLUM			AGMENELLUM (4) BREB. ,1839				p98090
ALK	Alkalinity	mg/L	Alkalinity, water, filtered, incremental titration, field, milligrams per liter as calcium carbonate	SM2320	P410	1	p39086
ALUMINUM		ug/L	Aluminum, water, filtered, micrograms per liter				p01106
AMMONIA_N_FILT		mg/L	Ammonia plus organic nitrogen, water, filtered, milligrams per liter as nitrogen				p00623

AMMONIA_N_JIRKA		mg/L	Ammonia plus organic nitrogen, water, filtered, modified jirka method, milligrams per liter as nitrogen				p99894
AMMONIA_N_SUS		mg/L	Ammonia plus organic nitrogen, suspended sediment, total, milligrams per liter as nitrogen				p00624
AMMONIA_N_UNFILT		mg/L	Ammonia plus organic nitrogen, water, unfiltered, milligrams per liter as nitrogen				p00625
AMMONIA_N_UNFILT_JIRKA		mg/L	Ammonia plus organic nitrogen, water, unfiltered, modified jirka method, milligrams per liter as nitrogen				p99892
AMMONIA_NH4_FILT		mg/L	Ammonia, water, filtered, milligrams per liter as NH4				p71846
AMMONIA_NH4_UNFILT		mg/L	Ammonia, water, unfiltered, milligrams per liter as NH4				p71845
AMMONIA_UNFILT		mg/L	Ammonia, water, unfiltered, milligrams per liter as nitrogen				p00610
ANABAENOPSIS			ANABAENOPSIS (4) USGS,ACL				p98166
ANACYCTIS			ANACYSTIS (4) MENEGH,1837				p98082
ANKISTRODESMUS			ANKISTRODESMUS (4) USGS,ACL				p96202
As_DIS	Arsenic, Dissolved	ug/L	Dissolved Arsenic	EPA200.8 or ICP/MS	P1000	0	
AS_FILT		ug/L	Arsenic, water, filtered, micrograms per liter				p01000
AS_SUS		ug/L	Arsenic, suspended sediment, total, micrograms per liter				p01001

As_TR	Arsenic, Tot Rec	ug/L	TOTAL RECOVERABLE ARSENIC	EPA200.8	P978	0	
AS_UNFILT		ug/L	Arsenic, water, unfiltered, micrograms per liter				p01002
ASTERIONELLA			ASTERIONELLA (4) USGS,ACL				p96763
BA_FILT		ug/L	Barium, water, filtered, micrograms per liter				p01005
BA_SUS		ug/L	Barium, suspended sediment, recoverable, micrograms per liter				p01006
BA_UNFILT		ug/L	Barium, water, unfiltered, recoverable, micrograms per liter				p01007
BERYLLIUM		ug/L	Beryllium, water, filtered, micrograms per liter				p01010
BICARB_FIXED		mg/L	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams per liter				p00440
BICARB_TITR_FILT		mg/L	Bicarbonate, water, filtered, incremental titration, field, milligrams per liter				p00453
BICARB_TITR_UNFILT		mg/L	Bicarbonate, water, unfiltered, incremental titration, field, milligrams per liter				p99440; p00450
BIOMASS_CHLOR		number	Biomass/chlorophyll ratio, periphyton, number				p70950
BORON_FILT		ug/L	Boron, water, filtered, micrograms per liter				p01020
BORON_UNFILT		ug/L	Boron, water, unfiltered, recoverable, micrograms per liter				p01022

CA		mg/L	Calcium, water, filtered, milligrams per liter				p00915
CARB_FIXED		mg/L	Carbonate, water, unfiltered, fixed endpoint (pH 8.3) titration, field, milligrams per liter				p00445
CARB_TITR_FILT		mg/L	Carbonate, water, filtered, incremental titration, field, milligrams per liter				p00452
CARB_TITR_UNFILT		mg/L	Carbonate, water, unfiltered, incremental titration, field, milligrams per liter				p00447; p99445
CARB_TITR_UNFILT_CACO3		mg/L	Carbonate, water, unfiltered, incremental titration, field, milligrams per liter as calcium carbonate				p99430
Cd	Cadmium, Tot Rec	ug/L		EPA200.8	P1113	0.1	
Cd_DIS	Cadmium, Dissolved	ug/L		EPA200.8	P1025	0	
CD_FILT		ug/L	Cadmium, water, filtered, micrograms per liter				p01025
CD_SUS		ug/L	Cadmium, suspended sediment, recoverable, micrograms per liter				p01026
CD_UNFILT		ug/L	Cadmium, water, unfiltered, micrograms per liter				p01027
CELL		cells/mL	Total cell count, water, cells per milliliter				p95200
CHLAMYDOMONAS			CHLAMYDOMONAS (4) USGS,ACL				p96014
CHLORELLA			CHLORELLA (4) USGS,ACL				p96205
CHLORIDE		mg/L	Chloride, water, filtered, milligrams per liter				p00940

CHLORO_A			Chlorophyll a, periphyton, chromatographic				p70957
CHLORO_B			Chlorophyll b, periphyton, chromatographic				p70958
CHLOROCOCCUM			CHLOROCOCCUM (4) USGS,ACL				p96167
CHROMIUM_FILT		ug/L	Chromium, water, filtered, micrograms per liter				p01030
CHROMIUM_SUS		ug/L	Chromium, suspended sediment, recoverable, micrograms per liter				p01031
CHROMIUM_UNFILT		ug/L	Chromium, water, unfiltered, recoverable, micrograms per liter				p01034
CHROOMONA			CHROOMONAS (4) USGS,ACL				p96426
CO2		mg/L	Carbon dioxide, water, unfiltered, milligrams per liter				p00405
COBALT_FILT		ug/L	Cobalt, water, filtered, micrograms per liter				p01035
COBALT_SUS		ug/L	Cobalt, suspended sediment, recoverable, micrograms per liter				p01036
COBALT_UNFILT		ug/L	Cobalt, water, unfiltered, recoverable, micrograms per liter				p01037
COCCONEIS			COCCONEIS (4) USGS,ACL				p96778
COLOR	Color	Pt-Co	Color, water, filtered, platinum cobalt units	EPA110.2	P80	0	p00080
COND	Conductivity	umhos/cm	Daily instrument calibrations (Former method SM2510-B)	SM2510B	P95	0	
COPPER_FILT		ug/L	Copper, water, filtered, micrograms per liter				p01040

COPPER_SUS		ug/L	Copper, suspended sediment, recoverable, micrograms per liter				p01041
COPPER_UNFILT		ug/L	Copper, water, unfiltered, recoverable, micrograms per liter				p01042
COSMARIUM			COSMARIUM (4) USGS,ACL				p96313
Cr	Chromium, Tot Rec	ug/L	hex and tri	EPA200.8	P1118	0.2	
Cr_DIS	Chromium, Dissolved	ug/L	hex and tri	EPA200.8	P1030	0	
CRUCIGENI			CRUCIGENIA (4) USGS,ACL				p96240
CRYPTOMONAS			CRYPTOMONAS (4) USGS,ACL				p96430
CRYPTOPHYCEA			CRYPTOPHYCEAE (1) USGS,ACL				p96423
Cu	Copper, Tot Rec	ug/L		EPA200.8	P1042 or	3	
Cu_DIS	Copper, Dissolved	ug/L		EPA200.8	P1040	0	
CYCLOTELLA			CYCLOTELLA (4) USGS,ACL				p96706
CYMBELLA			CYMBELLA (4) USGS,ACL				p96806
DIATOMA			DIATOMA (4) USGS,ACL				p96759
DICTYOSPHAERIUM			DICTYOSPHAERIUM (4) USGS,ACL				p96209
DO_MGL	DO	mg/L	Dissolved oxygen, water, unfiltered, milligrams per liter				p00300
DO_PERCENT	DO	%	Dissolved oxygen, water, unfiltered, percent of saturation				p00301
ELAKATOTHRIX			ELAKATOTHRIX (4) USGS,ACL				p96086
ENT	Enterococci Bacteria	#/100ml	Method also reported as SM17-9230C	EPA1600		1	
FECAL_COL	Fecal Coliforms	#/100ml	Fecal coliform, M	SM16-909C	P31616	1	p31616; p31625
FLOW	Flow	CFS	Ecology rating or Estimated by outside agency	RATINGF or EST_GageF	P60	0	

FLUORIDE		mg/L	Fluoride, water, filtered, milligrams per liter				p00950
FRAGILARIA			FRAGILARIA (4) USGS,ACL				p96764
GLENODINIUM			GLENODINIUM (4) USGS,ACL				p96484
GOMPHONEMA			GOMPHONEMA (4) USGS,ACL				p96802
HANTZSCHIA			HANTZSCHIA (4) USGS,ACL				p96811
HARD	Hardness	mg/L	Hardness, water, milligrams per liter as calcium carbonate	SM2340B	P900	1	p00900
HARD_NONCARB		mg/L	Noncarbonate hardness, water, unfiltered, field, milligrams per liter as calcium carbonate				p00902
HARD_NONCARB_AS _CACO3		mg/L	Noncarbonate hardness, water, milligrams per liter as calcium carbonate				p95902
Hg	Mercury, Total	ug/L	All Hg data should have been reported here.	EPA245.7	P71900	0.05	
IRON_FILT		ug/L	Iron, water, filtered, micrograms per liter				p01046
IRON_SUS		ug/L	Iron, suspended sediment, recoverable, micrograms per liter				p01044
IRON_UNFILT		ug/L	Iron, water, unfiltered, micrograms per liter				p71885
IRON_UNFILT_RECOV		ug/L	Iron, water, unfiltered, recoverable, micrograms per liter				p01045
K			Potassium				p82068
K_FILT		mg/L	Potassium, water, filtered, milligrams per liter				p00935
KIRCHNERIELLA			KIRCHNERIELLA (4) USGS,ACL				p96215

LEAD_FILT		ug/L	Lead, water, filtered, micrograms per liter				p01049
LEAD_SUS		ug/L	Lead, suspended sediment, recoverable, micrograms per liter				p01050
LEAD_UNFILT		ug/L	Lead, water, unfiltered, recoverable, micrograms per liter				p01051
LITHIUM		ug/L	Lithium, water, filtered, micrograms per liter				p01130
LYNGBYA			LYNGBYA (4) AGARD' ,1824				p98131
MALLOMONAS			MALLOMONAS (4) USGS,ACL				p96595
MASTOGLOIA			MASTOGLOIA (4) USGS,ACL				p96790
MELOSIRA			MELOSIRA (4) USGS,ACL				p96707
MERCURY_FILT		ug/L	Mercury, water, filtered, micrograms per liter				p71890
MERCURY_SUS		ug/L	Mercury, suspended sediment, recoverable, micrograms per liter				p71895
MERCURY_UNFILT		ug/L	Mercury, water, unfiltered, recoverable, micrograms per liter				p71900
MG		mg/L	Magnesium, water, filtered, milligrams per liter				p00925
MN_FILT		ug/L	Manganese, water, filtered, micrograms per liter				p01056
MN_SUS		ug/L	Manganese, suspended sediment, recoverable, micrograms per liter				p01054
MN_UNFILT		ug/L	Manganese, water, unfiltered, recoverable, micrograms per liter				p01055

MOLYB		ug/L	Molybdenum, water, filtered, micrograms per liter				p01060
NA		mg/L	Sodium, water, filtered, milligrams per liter				p00930
NA_ADSORP		number	Sodium adsorption ratio, water, number				p00931
NA_CATIONS		%	Sodium fraction of cations, water, percent in equivalents of major cations				p00932
NA_K		mg/L	Sodium plus potassium, water, filtered, milligrams per liter as sodium				p00933
NAVICULA			NAVICULA (4) USGS,ACL				p96791
NH3_FILT		mg/L	Ammonia, water, filtered, milligrams per liter as nitrogen				p00608
NH3_N	NH3-N	mg/L	Collected using unspecified techniques and preservation	EPA350.1	P610	0.01	
NI_DIS	Nickel, Dissolved	ug/L		EPA200.8	P1065	0	
NI_TR	Nickel, Tot Rec	ug/L		EPA200.8	P1074	0	
NICKEL_FILT		ug/L	Nickel, water, filtered, micrograms per liter				p01065
NICKEL_SUS		ug/L	Nickel, suspended sediment, recoverable, micrograms per liter				p01066
NICKEL_UNFILT		ug/L	Nickel, water, unfiltered, recoverable, micrograms per liter				p01067
NIT_FILT		mg/L	Total nitrogen, water, filtered, milligrams per liter				p00602
NIT_UNFILT		mg/L	Total nitrogen, water, unfiltered, milligrams per liter				p00600

NIT_UNFILT_AS_N		mg/L	Total nitrogen, water, unfiltered, milligrams per liter as nitrate				p71887
NITZSCHIA			NITZSCHIA (4) USGS,ACL				p96812
NO2_DIS	Nitrite-Nitrogen, Dissolved	mg/L	Collected using unspecified techniques and preservation or Collected in acid-washed passenger, acid-preserved, shipped on ice.	EPA353.2	P613	0.01	
NO2_FILT		mg/L	Nitrite, water, filtered, milligrams per liter				p71856
NO2_FILT_AS_N		mg/L	Nitrite, water, filtered, milligrams per liter as nitrogen				p00613
NO2_N	Nitrite-Nitrogen	mg/L		EPA353.2	P615	0.01	
NO2_NO3	NO2-NO3	mg/L	Collected in acid-washed passenger, acid-preserved, shipped on ice. EIM Method was EPA353.2 prior to 09/00	SM4500NO3I	P630	0.01	
NO2_NO3_FILT		mg/L	Nitrite plus nitrate, water, filtered, milligrams per liter as nitrogen				p00631
NO2_NO3_UNFILT		mg/L	Nitrite plus nitrate, water, unfiltered, milligrams per liter as nitrogen				p00630
NO2_UNFILT_AS_N		mg/L	Nitrite, water, unfiltered, milligrams per liter as nitrogen				p00615
NO3_FILT		mg/L	Nitrate, water, filtered, milligrams per liter				p71851
NO3_FILT_AS_N		mg/L	Nitrate, water, filtered, milligrams per liter as nitrogen				p00618

NO3_N	Nitrate-Nitrogen	mg/L		EPA353.2	P620	0.01	
NO3_UNFILT		mg/L	Nitrate, water, unfiltered, milligrams per liter				p71850
NO3_UNFILT_AS_N		mg/L	Nitrate, water, unfiltered, milligrams per liter as nitrogen				p00620
O_PO4		mg/L	Orthophosphate, water, filtered, milligrams per liter				p00660
O_PO4_FILT_AS_P		mg/L	Orthophosphate, water, filtered, milligrams per liter as phosphorus				p00671
O_PO4_UNFILT_AS_P		mg/L	Orthophosphate, water, unfiltered, milligrams per liter as phosphorus				p70507
OC_FILT		mg/L	Organic carbon, water, filtered, milligrams per liter				p00681
OC_SUS		mg/L	Organic carbon, suspended sediment, total, milligrams per liter				p00689
OC_UNFILT		mg/L	Organic carbon, water, unfiltered, milligrams per liter				p00680
OCHROMONAS			OCHROMONAS (4) USGS,ACL				p96608
OOCYSTIS			OOCYSTIS (4) USGS,ACL				p96218
OP_DIS	OP-dis	mg/L	Collected in acid-washed passenger, acid-preserved, shipped on ice. EIM Method was EPA365.3M prior to 05/01	SM4500PG	P671	0	
ORG_N_FILT		mg/L	Organic nitrogen, water, filtered, milligrams per liter				p00607

ORG_N_UNFILT		mg/L	Organic nitrogen, water, unfiltered, milligrams per liter				p00605
OSCILLATORIA			OSCILLATORIA (4) VAUCHER,1803				p98136
OXYGEN	Oxygen	mg/L	Winkler with biiodate correction for thiosulfate. (after Feb 89)	EPA360.2	P300	0	
P_FILT		mg/L	Phosphorus, water, filtered, milligrams per liter				p00666
P_FILT_JIRKA		mg/L	Phosphorus, water, filtered, modified jirka method, milligrams per liter				p99893
P_UNFILT		mg/L	Phosphorus, water, unfiltered, milligrams per liter				p00665
P_UNFILT_AS_P		mg/L	Phosphorus, water, unfiltered, milligrams per liter as phosphate				p71886
P_UNFILT_JIRKA		mg/L	Phosphorus, water, unfiltered, modified jirka method, milligrams per liter				p99891
PANDORINA			PANDORINA (4) USGS,ACL				p96038
Pb	Lead, Tot Rec	ug/L		EPA200.8	P1114	1	
Pb_DIS	Lead, Dissolved	ug/L		EPA200.8	P1049	0	
PERIPHYTON_ASH		g/sq m	Biomass, periphyton, ash weight, grams per square meter				p00572
PERIPHYTON_DRY		g/sq m	Biomass, periphyton, dry weight, grams per square meter				p00573
PH	pH	pH	Gel probe, infrequent calibration	PHMETERF	P400	1	p00400

PH_LAB		SU	pH, water, unfiltered, laboratory, standard units				p00403
PHYTOPLANKTON		cells/mL	Phytoplankton, total, cells per milliliter				p60050
PINNULARIA			PINNULARIA (4) USGS,ACL				p96793
PO4		mg/L	Phosphate, water, unfiltered, milligrams per liter				p00650
PRESS	Pressure	mm/Hg		BAROF	P25	0	
RESIDUE_DISS		tons per day	Residue, water, dissolved, tons per day				p70302
RESIDUE_EVAP		mg/L	Residue on evaporation, dried at 180 degrees Celsius, water, filtered, milligrams per liter				p70300
RESIDUE_FILT		tons per acre	Residue, water, filtered, tons per acre				p70303
RESIDUE_FILT_sum		mg/L	Residue, water, filtered, sum of constituents, milligrams per liter				p70301
RHOICOSPHENIA			RHOICOSPHENIA (4) USGS,ACL				p96779
SALINITY	Salinity	PPS					
SCENEDESMUS			SCENEDESMUS (4) USGS,ACL				p96243
SCHIZOTHRIX			SCHIZOTHRIX (4) KUETZ. ,1843				p98150
SCHROEDERIA			SCHROEDERIA (4) USGS,ACL				p96190
SEDS_BED		%	Bed sediment, dry sieved, sieve diameter, percent smaller than 0.063 millimeters				p80164
SELEN_FILT		ug/L	Selenium, water, filtered, micrograms per liter				p01145

SELEN_SUS		ug/L	Selenium, suspended sediment, total, micrograms per liter				p01146
SELEN_UNFILT		ug/L	Selenium, water, unfiltered, micrograms per liter				p01147
SELENASTRUM			SELENASTRUM (4) USGS,ACL				p96225
SES_SED_SIEVE		%	Suspended sediment, sieve diameter, percent smaller than 0.063 millimeters				p70331
SILICA		mg/L	Silica, water, filtered, milligrams per liter				p00955
SILVER_FILT		ug/L	Silver, water, filtered, micrograms per liter				p01075
SILVER_SUS		ug/L	Silver, suspended sediment, recoverable, micrograms per liter				p01076
SILVER_UNFILT		ug/L	Silver, water, unfiltered, recoverable, micrograms per liter				p01077
SP_COND	Specific Conductivity	ms/cm	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius				p00095
SP_COND_MS		microsiemens per centimeter at 25 degrees Celsius	Specific conductance, water, unfiltered, laboratory, microsiemens per centimeter at 25 degrees Celsius				p90095
STREPTO		colonies per 100 milliliters	Fecal streptococci, KF streptococcus MF method, water, colonies per 100 milliliters				p31673

STRONT		ug/L	Strontium, water, filtered, micrograms per liter				p01080
SULFATE		mg/L	Sulfate, water, filtered, milligrams per liter				p00945
SULFATE_UNCORR		mg/L	Sulfate, water, filtered, uncorrected, milligrams per liter				p99890
SUS_SED_DISCHARGE		tons per day	Suspended sediment discharge, tons per day				p80155
SUS_SED_MPL		mg/L	Suspended sediment concentration, milligrams per liter				p80154
SUSSOL	Sussol	mg/L		SM2540D	P530	1	
SYNEDRA			SYNEDRA (4) USGS,ACL				p96765
TEMP	Temperature	deg C	Thermister (in river)	TEMPTHERMF	P10	0	
TETRAEDRON			TETRAEDRON (4) USGS,ACL				p96226
TETRASTRUM			TETRASTRUM (4) USGS,ACL				p96245
TKN	Kjeldahl Nitrogen, Total	mg/L		EPA351.2	P625	0.01	
TOC	Total Organic Carbon	mg/L		EPA415.1	P680	1	
TOT_COLIF		M	Total coliform, M				p31501; p31503
TOT_COLIF_TPN		MPN/100mL	Total coliform, completed test, water, most probable number per 100 milliliters				p31507
TP_P	TP_P	mg/L	Collected in acid-washed passenger, acid-preserved, shipped on ice. Sometimes from MEL as SM4500PI, sometimees as EPA365.1.	EPA365.1	P665	0.01	

TP_PInLine	TP_PInLine	mg/L	Latchet In-line digestion. Probable high bias in TP, though not in OP or TPLL with this method. Collected in acid-washed passenger, acid-preserved, shipped on ice. Sometimes from MEL as SM4500PI, sometimees as EPA365.1.	SM4500PI		0.01	
TPN	TPN	mg/L	Collected in acid-washed passenger, acid-preserved, shipped on ice. Manchester/reg10 VAX call this P100021. (Former method: "valderama")	SM4500NB	P600	0.01	
TRACHELOMONAS			RACHELOMONAS (4) USGS,ACL				p96392
TURBIDITY	Turbidity	NTU	Turbidity, water, unfiltered, nephelometric turbidity units	SM2130	P82079	1	p00076
Turb-JTU	Turbidity	JTU	All turbidities collected prior to 10/79 were set to this code (JTUs) on 7 feb 03			0	p00070
VANADIUM		ug/L	Vanadium, water, filtered, micrograms per liter				p01085
ZINC_FILT		ug/L	Zinc, water, filtered, micrograms per liter				p01090
ZINC_SUS		ug/L	Zinc, suspended sediment, recoverable, micrograms per liter				p01091

ZINC_UNFILT		ug/L	Zinc, water, unfiltered, recoverable, micrograms per liter				p01092
Zn	Zinc, Tot Rec or Zinc, Total	ug/L		EPA200.8	P1094 or	4	
Zn_DIS	Zinc, Dissolved						

lkp_CREW					
CREW_ID	**CREW_NAME**	**ORGANIZATION**	**WORK_TITLE**	**EMAIL**	**PHONE**
BN	Bryan Nass	LGL Ltd.	Contractor	bnass@lgl.com	509-962-8294
CF	Chris Fisher	Colville Confederated Tribes	Anadromous Fisheries Biologist III	Chris.Fisher@colvilletribes.com	509-422-7427
CL	Colette Louie	Okanagan Nation Alliance	Fisheries Technician		
EB	Edward Berrigan	Colville Confederated Tribes	Fisheries Technician I		
EC	Esteban Cruz	Colville Confederated Tribes	Summer Youth		
ET	Eliott Tonasket	Okanagan Nation Alliance	Fisheries Technician		
FJ	Fred Jordan	Colville Confederated Tribes	Fisheries Technician I	Fred.Jordan@colvilletribes.com	
JA	John Arterburn	Colville Confederated Tribes	Anadromous Fisheries Biologist II	John.Arterburn@colvilletribes.com	509-422-7424
JL	Jordan Leskinen	Colville Confederated Tribes	Fisheries Technician I		509-322-3060
KK	Keith Kistler	Colville Confederated Tribes	Anadromous Fisheries Biologist I	Keith.Kistler@colvilletribes.com	509-422-7429
KL	Kari Long	Okanagan Nation Alliance	Fisheries Biologist		250-707-0095
KM	Kevin Manuel	Colville Confederated Tribes	Fisheries Technician I	the_colville_n8ive@yahoo.com	
LF	Lincoln Feddersen	Colville Confederated Tribes	Fisheries Technician		
LGL	Jill Bement	LGL Ltd.	Contractor	bnass@lgl.com	509-962-8294
LN	Lynnea Niens	Okanagan Nation Alliance	Fisheries Technician		
MR	Michael Rayton	Colville Confederated Tribes	Anadromous Fisheries Biologist I	Michael.Rayton@colvilletribes.com	509-422-7434
MS	Mason Squakim	Okanagan Nation Alliance	Fisheries Technician		
MW	Michelle Walsh	Okanagan Nation Alliance			
NP	Nicole Peone	Colville Confederated Tribes	Fisheries Technician I		
ONA	ONA - general	Okanaga Nation Alliance	General Staff		
OZ	Oly Zacherle	Colville Confederated Tribes	Summer Youth		
RD	Rhonda Dasher	Colville Confederated Tribes	Anadromous Fisheries Biologist I	Rhonda.Dasher@colvilletribes.com	509-422-7439
RT	Rich Tonasket	Colville Confederated Tribes	Fisheries Technician I		509-633-3556
SC	Smith Condon	Colville Confederated Tribes	Fisheries Technician I		
SS	Sidryn Sam	Colville Confederated Tribes	Fisheries Technician I	sincerethreeirons@hotmail.com	
TE	Tim Erb, Jr.	Colville Confederated Tribes	Fisheries Technician I	Tim.Erb@colvilletribes.com	509-422-7432
TG	Tatum Gunn	Colville Confederated Tribes	Fisheries Technician I		509-422-2294
TM	Tony Moore	Colville Confederated Tribes	Summer Youth		
VP	Von Peterson	Colville Confederated Tribes	Summer Youth		
ZO	Zacherle Oly	Colville Confederated Tribes	Summer Youth		

lkp_EXTERNAL MARK	
MARK	**DESC**
AD	Adipose Clip
CA	Caudal Clip
EL	Elastomer
FL	Floy Tag
JT	Jaw Tag
LV	Left Ventral Clip
OT	Other
PC	Pelvic Clip
RV	Right Ventral Clip
TR	Radio Transmitter
UM	Unmarked
UN	Unknown

lkp_HARDDRIVE		
HARDDRIVE	**HD Type**	**TOTAL_MB**
-9		0
1	Western Digital WD Caviar SE 250.0 GB	250075
2		250075
3	Western Digital WD Caviar SE 250.0 GB	250075
4		200000
5		200000
6	Western Digital WD Caviar SE 250.0 GB	250075
7	Western Digital WD Caviar SE 250.0 GB	250075
8		200000
9		200000
10		200000
11		200000

lkp_LIFESTAGE			
FISHTYPE	**DESC**	**ALT_DESC**	**STAGECODE**
ADULT	Adults		T
ALEVIN	Egg Sac		E
FRY	YOY		F
JUVENILE	Juvenile Year 1	Sockeye Year 1 Osoyoos	J
PARR	Juvenile Year 2	Sockeye Year 2 Skaha	P
SMOLT	Smolts		S

lkp_QUAL_FLOW	
QUALID	**DESC**
A	The data were measured on site and used in the development of the stage discharge curve
B	The reading is below the existing curve and therefore outside of the knowledge reference used to develop the stage discharge curve (i.e.data are of questionable quality)
E	Data are estimated-(It is my assumption that this means no measurement was taken because technically even when you get measure stage height you end up estimating discharge?)

lkp_QUAL_WQCHEM	
QUALID	**DESC**
*	possible quality problem with the result
<	Actual value is known to be less than the value shown.
>	Actual value is known to be greater than the value shown.
A	Average value
E	Reported result is an estimate.
G	Value is greater than result reported.
J	The analyte was positively identified. The associated numerical result is an estimate.
J?	Converted from older remark codes with various definitions. Result should be considered an estimate.
M	Presence of material verified but not quantified
N	Presumptive evidence of presence of material
S	Most probable value
U	The analyte was not detected at or above the reported result. (USGS: Material specifically analyzed for but not detected.)
UJ	The analyte was not detected at or above the reported estimated result.
V	Value affected by contamination

APPENDIX C

Original Requests for Outputs.

Analyst	Source	Variable	Description	
		Site	Site identification	
		Basin	Name of major subbasin in which the site is located (e.g., Wenatchee, Entiat, etc.)	all Okanogan
		Wtrshed	Name of watershed within the subbasin in which the site is located (e.g., Nason)	
		Yr	Year that the site was sampled	
		SmpEvnt	Visit number that the site was sampled for habitat in a given year	
		SurveyType	Snorkel, Habitat, Screw Trap, etc.	
		SurveySubType	e.g. Day or Night	irrelevant
PBI	Pacific Biodiversity Institute's GIS classification	**BailEcoR**	Name of the dominant ecoregion described by Bailey	1? - ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**OmerEcoRNa**	Name of the ecoregion described by Omernik	1? - ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**OmerEcoRCd**	Numeric code for the name of the ecoregion described by Omernik	1? - ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**Prov**	Name of the Province in which the site is located	1? - ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**GeolNa**	Name of the dominant geologic type upstream from the site	ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**GeolCd**	Numeric code for the name of the dominant geologic type	ask Steve
ISEMP	Upstream catchment derived from 30m National Elevation Dataset	**BsnArea**	Basin area (km^2) upstream from the location of the site	
ISEMP	Upstream catchment derived from 30m National Elevation Dataset	**BsnRelf**	Elevation difference (m) between the site and the ridge top upstream from the site	
ISEMP	Stream length derived from 1:100k National Hydrography Dataset - Plus	**DrainDens**	Index of length of streams per unit area of basin upstream from the site	
ISEMP	Attribute from 1:100k National Hydrography Dataset - Plus	**StrmOrdr**	Strahler stream order in which the site is located	
PBI	Pacific Biodiversity Institute's GIS classification	**VBTLtr**	Naiman valley bottom type in which the site is located	ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**VBTCd**	Numeric code for Naiman valley bottom type in which the site is located	ask Steve
PBI	Pacific Biodiversity Institute's GIS classification	**VBWidth**	Ratio of valley bottom width to active channel width	
PBI	Pacific Biodiversity Institute's GIS classification	**VBConfine**	Degree that the valley walls confine the lateral migration of the stream channel	
PBI	Pacific Biodiversity Institute's GIS classification	**VBGrad**	Gradient (%) of the valley in which the site is located	
ISEMP	Road length determined from GIS based TIGER road layer	**RdDens**	Index of the length of roads per area of watershed upstream from the site	
ISEMP	Road length determined from GIS based TIGER road layer	**RipRdIndx**	Index of length of roads within riparian area per stream length upstream from the site	
PBI	Pacific Biodiversity Institute's GIS classification	**LndOwn**	Primary owner of land upstream from the site	Remote
PBI	Pacific Biodiversity Institute's GIS classification	**LndUse**	Primary land use upstream from the site	Remote
ISEMP	Determined from 30m National Elevation Dataset	**Elev**	Elevation (m) above sea level of the site	LIDAR
WSDOE	Field observation	**ChanTypLtr**	Rosgen channel type in which the site is located	
WSDOE	Field observation	**ChanTypCd**	Numeric code for the Rosgen channel type	
WSDOE	Field observation	**ChanGrad**	Average gradient (%) of the water surface within the site	
WSDOE	Field observation	**BFTypNa**	Montgomery/Buffington bed-form type within the site	
WSDOE	Field observation	**BFTypCd**	Numeric code for the Montgomery/Buffington bed-form type	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**Entrench**	Rosgen entrenchment ratio (floodprome width divided by bankfull stage)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**Sinuos**	Sinuosity measured within the site	
WSDOE	Field observation	**RchLnth**	Length (m) of the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**WetWdth**	Average wetted width (m) of the site	
ISEMP	Calculated as reach length multipled by wetted width	**WetSurfArea**	Wetted surface area (ha) of the site	avg wetted width x reach length
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Fine**	Percent of substrate particles that were fines (<0.06 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Snd**	Percent of substrate particles that were sand (0.06-2.00 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%FnGrav**	Percent of substrate particles that were fine gravels (2-16 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%CrsGrav**	Percent of substrate particles that were coarse gravels (16-64 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Cob**	Percent of substrate particles that were cobbles (64-250 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%SmBld**	Percent of substrate particles that were small boulders (250-1000 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%LgBld**	Percent of substrate particles that were large boulders (1000-4000 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Hrdpn**	Percent of substrate that was hardpan	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%RBedr**	Percent of substrate that was rough bedrock (>4000 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%SBedr**	Percent of substrate that was smooth bedrock (>4000 mm)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Concr**	Percent of substrate that was concrete	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Wood**	Percent of substrate that was wood	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Other**	Percent of substrate that was other materials	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**DomSubNm**	Dominant substrate class within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**DomSubCd**	Numeric code for the dominant substrate class within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%Embedd**	Average substrate embeddedness (%)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**LWD10**	Large wood pieces per km with diameter greater than 10 cm	LWD_GT_1M, LWD_GT_2M (per KM?)
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**LWD15**	Large wood pieces per km with diameter greater than 15 cm	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**LWD30**	Large wood pieces per km with diameter greater than 30 cm	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**PlPool**	Number of plunge pools per km	PRIMARY POOL COUNT per REACH
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**ScPool**	Number of scour pools per km	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**DamPool**	Number of dammed pools per km	BEAVER POOL COUNT per REACH
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**TotPool**	Total number of all pools per km	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**ResPlDpth**	Average residual pool depth (cm) for all pools within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCAlgae**	Mean % that algae makes up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCMacroBryo**	Mean % that marcorphytes and bryophytes make up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCLrgWd**	Mean % that large wood makes up areal extent of fish cover within the site	Very similar metrics are collected (I.e., Proportion of canopy as…, Proportion of Understory…). They are collected as 0=Absent, 1=Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4= Very heavy (>75%). CCT DOES NOT COLLECT AT THIS TIME (LOW PRIORITY)
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCBrsh**	Mean % that brush makes up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCLvTrRt**	Mean % that live trees and roots make up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCOvrhVeg**	Mean % that overhanging vegetation makes up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCUndrBk**	Mean % that undercut banks make up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCBlders**	Mean % that boulders make up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**FCArtif**	Mean % that artificial (human made) structures makes up areal extent of fish cover within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**Bckwtr**	Number of backwaters, alcoves, and sidepools per km	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**OffChanPl**	Number of off-channel pools per km	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**OffChanPd**	Number of off-channel ponds per km	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**Oxbow**	Number of oxbows per km	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**SidChanNb**	Number of side channels per km	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**SidChanLgth**	Total length (m) of side channels within the site	LIDAR
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**BkflDpth**	Average bankfull depth (cm) within the site	Thalweg depth plus Bankful height (pers.comm KK
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**BkflWdth**	Average bankfull width (m) within the site	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**WD**	Average bankfull width to bankfull depth within the site	Bankful width/Bankful depth (pers.comm KK)
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**%UnstBk**	Mean % of unstable banks within the site	Don't Take bank Stability data (pers.comm KK)
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**CanConifer**	Percent of site with riparian canopy made up of conifers	Do not have Percentage of tree type (C or D), only proportion big trees, small trees, woody, etc.. We have whether the site is C or D or mixed or none CAN"T CALCULATE PERCENT, SO GET COUNT OF EACH PER SITE
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**CanDecid**	Percent of site with riparian canopy made up of deciduous trees	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**CanBrdleaf**	Percent of site with riparian canopy made up of broadleaf evergreen trees	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**CanMix**	Percent of site with riparian canopy made up of mixed trees	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**CanNone**	Percent of site with no riparian canopy	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDMine**	Site average of numerical value for presence of mining activity (weighted by proximity to channel)	We have this info - how is it calculated - weighted??? COUNT Ps, Cs and Bs PER SITE
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDLog**	Site average of numerical value for presence of logging activity (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDPasture**	Site average of numerical value for presence of pasture/range/hay fields activity (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDCrop**	Site average of numerical value for presence of row crops (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDDike**	Site average of numerical value for presence of walls/dikes/revetments (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDBldg**	Site average of numerical value for presence of buildings (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDPipe**	Site average of numerical value for presence of inlet/outlet pipes (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDLndfill**	Site average of numerical value for presence of landfull/trash (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDPark**	Site average of numerical value for presence of parks/lawns (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDLot**	Site average of numerical value for presence of pavement/cleared lots (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDUnpvdRd**	Site average of numerical value for presence of unpaved roads/trails/railroads (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDPvdRd**	Site average of numerical value for presence of paved roads/trails/railroads (weighted by proximity to channel)	
WSDOE	WSDOE calculated metric following EMAP analytical methods*	**RDAllRd**	Site average of numerical value for presence of all roads/trails/railroads (weighted by proximity to channel)	
		%CanCov	Mean % canopy cover (densiometer readings/17 * 100)	Do we calculate an AVERAGE wetted surface area for the SITEID (because we only can calculate using the HABITAT data)? How do you define daytime (for example 6 AM to 6PM)? DO THIS WITH SNORKEL DATA - THIS DATA IS ALWAYS COLLECTED IN DAYTIME. ALSO, DO NOT CALCULATE THIS WITH TRAP DATA B/C THERE ARE TOO MANY "SPECIAL CONSIDERATIONS"
ISEMP	See FishAbundance.mdb - qry_ForHillman_SpRichness	**SpRich**	Number of different species of fish observed within the site during daytime	
ISEMP	Count divided by wetted surface area	**catostomA**	Density (#/ha) of all suckers in the site during daytime	
ISEMP	Count divided by wetted surface area	**cottidA**	Density (#/ha) of all sculpins in the site during daytime	
ISEMP	Count divided by wetted surface area	**cyprinA**	Density (#/ha) of all minnows (Cyprinids) in the site during daytime	
ISEMP	Count divided by wetted surface area	**gasterA**	Density (#/ha) of all sticklebacks in the site during daytime	
ISEMP	Count divided by wetted surface area	**prosopA**	Density (#/ha) of all whitefish in the site during daytime	
ISEMP	Count divided by wetted surface area	**cuttA**	Density (#/ha) of all cutthroat in the site during daytime	
ISEMP	Count divided by wetted surface area	**RbStA**	Density (#/ha) of all rainbow steelhead in the site during daytime	
ISEMP	Count divided by wetted surface area	**RbCuttA**	Density (#/ha) of all rainbow/cutthroat hybrids in the site during daytime	
ISEMP	Count divided by wetted surface area	**sockA**	Density (#/ha) of all sockeye salmon in the site during daytime	
ISEMP	Count divided by wetted surface area	**cohoA**	Density (#/ha) of all coho salmon in the site during daytime	
ISEMP	Count divided by wetted surface area	**chinA**	Density (#/ha) of all chinook salmon in the site during daytime	
ISEMP	Count divided by wetted surface area	**TotOncorA**	Density (#/ha) of all species of Oncorhynchus in the site during daytime	
ISEMP	Count divided by wetted surface area	**bullA**	Density (#/ha) of all bull trout in the site during daytime	
ISEMP	Count divided by wetted surface area	**brookA**	Density (#/ha) of all brook trout in the site during daytime	
ISEMP	Count divided by wetted surface area	**TotCharA**	Density (#/ha) of all charr species in the site during daytime	
ISEMP	Count divided by wetted surface area	**TotSalA**	Density (#/ha) of all salmon/trout species in the site during daytime	
ISEMP	Count divided by wetted surface area	**TotFishA**	Density (#/ha) of all fish in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**catostomB**	Biomass (gm/ha) of all suckers in the site during daytime	Email from Tracy (dated Jan 23) - not calculating biomass.
ISEMP	summed biomass** divided by wetted surface area	**cottidB**	Biomass (gm/ha) of all sculpins in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**cyprinB**	Biomass (gm/ha) of all minnows (Cyprinids) in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**gasterB**	Biomass (gm/ha) of all sticklebacks in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**prosopB**	Biomass (gm/ha) of all whitefish in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**cuttB**	Biomass (gm/ha) of all cutthroat in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**RbStB**	Biomass (gm/ha) of all rainbow steelhead in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**RbCuttB**	Biomass (gm/ha) of all rainbow/cutthroat hybrids in the site during daytime	
ISEMP	summed biomass** divided by wetted surface area	**sockB**	Biomass (gm/ha) of all sockeye salmon in the site during daytime	

Appendix C2: Original Requests for Outputs.			
Email from KK dated July 10, 2007 How can we query water quality, flow and temperature data for the water year and not by separate years? The water year goes from October 1st of one year to September 30th of the following year. (example October 1, 2005 to September 30, 2006)	RLqry_A_WATERYEAR_FLOW RLqry_A_WATERYEAR_FLOW check RLqry_A_WATERYEAR_FLOW_ Crosstab	RLqry_B_WATERYEAR_TEMP RLqry_B_WATERYEAR_TEMP check RLqry_B_WATERYEAR_TEMP_Crosstab	RLqry_C_WATERYEAR_WQ RLqry_C_WATERYEAR_WQ check RLqry_C_WATERYEAR_WQ-enterchemcode_Crosstab - note need to go into the design and type in the CHEMCODE RLqry_C_WATERYEAR_WQ-nochemcode RLqry_C_WATERYEAR_WQ-nochemcode check RLqry_C_WATERYEAR_WQ-nochemcode_Crosstab
Email from KK dated May 14, 2007			
1. Flow: I have charted a 12 year moving average versus the current year flow for all sites in the database. I also have plotted a 12 year trend using average flow for the year, low flow average for the year and high flow average for the year.	~RLqry_D_FLOW_MOVINGAVG ~RLqry_D_FLOW_WATERYEAR_AVGMINMAX	~CHART_D_FLOW_AVG MIN MAX ~CHART_D_FLOW_MOVINGAVG	
2. Habitat: What I have done so far is to take all of the parameters that we collect (similar to your stoplight spread sheet) and done comparisons by year. Then I have charted these parameters against each other in simple charts to see how the data compares year top year. What would be good for now is to take your stoplight spread sheet and chart those values with confidence intervals against each other by year. Then make simple graphs like I have done in the examples.	to do		

3. Water Quality: I would like to see charts made of all the values we/doe collect, by site, using a 12 year moving average versus the current year. I have done this for some of the values in the example.	to do		
4. Snorkel report: Please have a look at the report. The excel sheet for the snorkel is what I would like to have in a report.	to do		
5. Temperature: So far I have done the same for temperature as flow. I would like to have this kind of report along with Johns spread sheet report. (no excel sheet included)	to do		
Email from Mike Rayton dated May 11, 2007			
This was sent to me today from Kris Peterson at NOAA Fish as an example of the type of monthly report we need to submit in order to remain in compliance with our smolt monitoring activities, specifically, the write ups on pages 4 & 5.	to do		
Email from MR dated May 14, 2007			
I have a question about parsing the rotary data. I believe that the Access program is tallying fish by calendar date (00:00 hours through 23:59). This, unfortunately, does not adequately reflect our trapping period. Since we trap from approximately 19:00 to 04:00 hours on two separate calendar days, the query counts fish collected from two separate overnight periods (00:00 to 04:00 and 19:00 to 23:59). Is there a way to write a query (I know there must be a way, but easy way?) that solves this problem?	RLqry_J__SpCounts_TRAP_NONSAL_ENUM_trapping period		
Phone Requests from KK and MR			
How can we calculate the time spent each day in the traps	RLqry_K_TIMEDIFF		