

SAMPLE & ANALYSIS PLAN

Water Quality Monitoring: Mid Coast Basin TMDL Development for Sedimentation

Version 2.3 – May 25, 2009

Group A: Project Management

A1. Title and Approval Sheet

Bobbi Lindberg / DEQ Project Manager	Date
Eddie Huckins / Lincoln SWCD Project Coordinator	Date
Chris Redman / DEQ Quality Assurance Officer (QAO)	Date
Liz Vollmer-Buhl / Siuslaw Project Manager	Date
Steve Hanson / DEQ Laboratory Volunteer Monitoring Coordinator	Date
Wayne Kauzlarich / DEQ Western Region Monitoring Coordinator	Date

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Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

GROUP A: PROJECT MANAGEMENT 1

- A1. Title and Approval Sheet 1
- A2. Table of Contents 3
- A3. Distribution List 4
- A4. Project/Task Organization 4
- A5. Purpose Statement/Problem Definition/Background 5
- A6. Project Task/Description 6
- A7. Measurement Quality Objectives 9
- A8. Training Requirements and Certification 9
- A9. Documentation and Records 9

GROUP B: DATA GENERATION AND AQUISITION 9

- B1. Sampling Process Design 9
- B2. Sampling Method Requirements 11
- B3. Sample Handling and Custody Procedures 11
- B4. Analytical Methods Requirements 11
- B5. Quality Control Requirements 12
- B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements 12
- B7. Instrument Calibration and Frequency 12
- B8. Inspection/Acceptance Requirements 12
- B9. Data Acquisition Requirements 12
- B10. Data Management 12

GROUP C: ASSESSMENT AND OVERSIGHT 12

- C1. Assessment and Response Actions 12
- C2. Reports to Management 12

GROUP D: DATA VALIDATION AND USABILITY 13

- D1. Data Review, Validation, and Verification 13
- D2. Validation and Verification Methods 13
- D3. Reconciliation with Data Quality Objectives 13

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

A3. Distribution List

The following is a list of all the individuals and their organizations who will receive a copy of the plan.

Name	Organization	Telephone
Elmer Ostling	Alsea Basin Team	(541) 563-3789
John Wooley	Alsea Basin Team	(541) 929-3817
Dave Rollins	Confederated Tribes of Siletz Indians (CTSI)	(541) 444-8287
Larry Marxer	DEQ TMDL Monitoring Coordinator for the Lab	(503) 229-6859
Stan van de Wetering	Confederated Tribes of Siletz Indians	(541) 444-8294
Eddie Huckins	Lincoln Soil & Water Conservation District	(541) 265-2631
Wayne Hoffman	Mid Coast Watersheds Council	(541) 265-9195
Paul Measeles	Oregon Department of Agriculture	(503) 986-4778
Bobbi Lindberg	Oregon Department of Environmental Quality	(541) 687-7353
Steve Hanson	Oregon Department of Environmental Quality	(503) 229-5449
Paul Katen	Salmon-Drift Watershed Council	(541) 994-9682
Melinda McComb	Surfriders/Oregon Coast Aquarium	(541) 574-6212
Dave Eisler	Siuslaw Watershed Council	(541) 935-7847
Liz Vollmer-Buhl	Siuslaw Watershed Council	(541) 268-3044
Barbara Ellis-Sugai	USDA/USFS-Siuslaw National Forest	(541) 750-7056
Jim Adler	Yachats Water Quality Monitoring Team	(541) 547-3858
Jerry Kimmel	Yachats Water Quality Monitoring Team	(541) 547-4647
Andrea Scharf	Yachats Water Quality Monitoring Team	(541) 547-3092
Kami Ellinson	USDA/USFS-Siuslaw National Forest	(541) 750 7101

A4. Project/Task Organization

The following lists the individuals or organizations that will be leaders in the project.

Name	Project Title/Responsibility	Contact
Bobbi Lindberg	Project Manager, QA Officer	(541) 687-7353
Eddie Huckins	Mid-Coast Project Coordinator	(541) 547-5425
Liz Vollmer-Buhl	Siuslaw Project Manager	(541) 268-3044

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

A5. Purpose Statement/Problem Definition/Background

The purpose of this project is to acquire baseline data to develop a TMDL for sedimentation in the Mid Coast Basin, Oregon.

The Mid Coast Basin is located on the central Oregon coast from Cascade Head south to Siltcoos and Tahkenitch Lakes. It has a combination of urban and rural communities, privately owned agricultural lands and public and industrial forest land. Of the approximately 2,765 stream miles in the Siletz-Yaquina, Alsea, Siuslaw, and Siltcoos sub-basins, approximately 78 miles are listed for sedimentation based on "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry" per OAR 340-041-0285(2)(J). The Siuslaw sub-basin hosts 48.6 miles of sedimentation listed streams, primarily in the North Fork Siuslaw River drainage. The North Fork Siuslaw is a 5th-field scale watershed. One Siuslaw listing, Taylor Creek (2.3 miles), is located in the Indian Creek 5th field watershed, which shares a ridgeline with the North Fork. The remaining 29.5 miles are on Elk Creek in the Siletz-Yaquina watershed. All of these streams have populations of anadromous salmon, steelhead, and cutthroat trout populations as well as other species of interest. The listings are presented in Table A5-1.

These streams are considered impaired under Section 303(d) of the Clean Water Act for sedimentation. As a result, ODEQ is required to develop a TMDL for 303(d) listed parameters. In 2005, various watershed monitoring groups under the direction of ODEQ and Lincoln SWCD staff collected data to be used for the development of temperature TMDLs for 303(d) listed streams in the Mid Coast Basin. The Siuslaw Watershed Council joined as a partner in this effort in 2005 and took on additional TMDL development and project responsibilities in 2006 with further temperature data collection on Lake Creek in the Siuslaw Watershed. This project will continue using this organizational structure to prepare a sampling and analysis plan (SAP) and coordinate collection, analysis, and assembly of data for the development of a sedimentation TMDL.

Among the goals of this program is to develop a meaningful measurement and criterion for sedimentation in Mid Coast streams. Varying geologies and natural sediment input sources (e.g., frequent landslides), the incomparable visual observation metric for listing of streams in the Siuslaw, and knowledge of land disturbances potentially affecting aquatic habitat presents the need to ensure a sampling methodology and assessment that accurately reflects whether the sediment load in the streams measured exceeds the natural capacity of the stream to generate, transport, and accumulate sediment.

Through discussion with ODEQ staff, Mid Coast Basin partners, and professional advisors on aquatic habitat in the Siuslaw Watershed, the use of a relative bed stability index (RBS) was deemed the most appropriate to meet the project goals for a sedimentation TMDL. DEQ Laboratory staff have identified numerous reference sites and have used the RBS approach to characterize these reference sites. The DEQ has undertaken the development of numerical sediment criteria, and staff are studying as a component of those criteria.

The field measurements required for RBS require extensive time, training, and site access. An additional evaluative tool may be GIS analysis of land use in each creek drainage studied, which may provide insight on watershed conditions.

TABLE A5-1: Mid Coast Streams Water-Quality Limited per 303(d) List for Sedimentation.

Stream Name	Miles	Watershed/Sub-Watershed
Drew Creek	0 – 3.2	Siuslaw/North Fork
McLeod Creek	0 – 7.4	Siuslaw/North Fork
Morris Creek	0 – 3.9	Siuslaw/North Fork
North Fork Siuslaw River	0.4 – 27.3	Siuslaw/North Fork
Porter Creek	0 – 4.9	Siuslaw/North Fork
Taylor Creek	0 – 2.3	Siuslaw/Indian

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

Elk Creek	0 – 29.5	Siletz-Yaquina/Elk
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TABLE A5-2: Mid Coast Streams, Identified as Category 3 - Insufficient Data to List for Sedimentation, per 303(d) List.

Stream Name	Miles	Watershed/Sub-Watershed
Alsea River	4.9 – 47.4	Alsea
Bob Creek	0 – 5.9	Alsea
Canal Creek	0 – 7.2	Alsea
Center Creek	0	Alsea
Drift Creek	0 – 29.5	Alsea
Eckman Creek	0.2 – 0.6	Alsea
Gwynn Creek	0 – 2.3	Alsea
Lobster Creek	0 – 17.7	Alsea
North Fork Beaver Creek	0 – 9.5	Alsea
North Fork Yachats River	0 – 6.3	Alsea
Scott Creek	0 – 1.1	Alsea
South Fork Alsea River	0 – 17.2	Alsea
Tenmile Creek	0 – 11.5	Alsea
Yachats River	13 – 16.6	Alsea
Bear Creek	0 – 4.9	Siletz/Yaquina
Big Rock Creek	0 – 9.7	Siletz/Yaquina
Butternut Creek	0 – 0	Siletz/Yaquina
Cedar Creek	0 – 11.8	Siletz/Yaquina
Panther Creek	0 – 2.5	Siletz/Yaquina
Rock Creek	0 – 5.3	Siletz/Yaquina
Siletz River	0 – 65.3	Siletz/Yaquina
Treat River	0 – 3.7	Siletz/Yaquina
Wright Creek	0 – 2.4	Siletz/Yaquina
Yaquina River	27.6 – 57.5	Siletz/Yaquina
Fiddle Creek	0 – 13.4	Siltcoos
Maple Creek	0 – 12.9	Siltcoos
Deadwood Creek	0 – 14.8	Siuslaw
Esmond Creek	0 – 11.2	Siuslaw
Indian Creek	0 – 22	Siuslaw
Knowles Creek	0 – 13.1	Siuslaw
Lake Creek	0 – 28.3	Siuslaw
Siuslaw River	5.7 – 105.9	Siuslaw
Whittaker Creek	0 – 6.4	Siuslaw
Wildcat Creek	0 – 18.8	Siuslaw

A6. Project Task/Description

Field Protocols

This project entails gathering the field data required to complete the RBS calculations and additional parameters. The RBS calculation used is that described in Section 3.2.7 of Quantifying Physical Habitat in Wadeable Streams (EPA/620/R-99/003, July 1999, by Philip Kaufman et al.). The field methodology used is that described in EMAP-Western Pilot Field Operations Manual for Wadeable Streams, Section 7 (Physical Habitat Characterization), Rev. 1, April 2001, by Philip Kaufman et al. Of the physical parameters described in Section 7, instream fish cover and shade are not required for calculating RBS, but may be useful indicators that should be measured.

Collection of EMAP Physical Habitat Characteristics requires access to a reach of stream 40 times the wetted

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

width and wading 11 transects to collect depth and substrate characteristics. The onset of the low-flow season is the best opportunity to evaluate the stream condition for sedimentation. Some streams may require access by inflatable raft, particularly in deep pool areas and larger streams. Site access limitations may require a modified, limited reach and transect number.

Site Selection

11 transects will be performed at each of the 30 sites. A site map and table of site locations will be prepared prior to field survey work. Table B1-1 provides an overview of the sites to be determined. Sites will be ground-truthed for stream conditions and access issues and may be adjusted as necessary, including reducing the number of transects performed at sites where accessible reaches are short. At least one reach will be measured at each of the streams listed on Table A5-1.

In the Mid-Coast of Oregon, seven waterbodies are listed as impaired by fine sediment under section 303(d) of the Clean Water Act: Drew Creek, Mcleod Creek, Morris Creek, Porter Creek, North Fork Siuslaw River, Taylor Creek, and Big Elk Creek. The first five are within the North Fork Siuslaw (NFS) 5th field HUC (1710020607), and Taylor Creek (part of the Indian Creek 5th field HUC 1710020606) is also within the Siuslaw 4th field HUC (17100206). Big Elk is a separate 5th field HUC (17100200402) in the Siletz-Yaquina 4th field (171002004). Field work was completed in the NFS during 2007. Analysis and reporting was completed for the NFS during 2008 (Mico & Mico 2008)

Of the six 303(d) listings within the Siuslaw River Watershed, five are within the North Fork 5th Field, and one (Taylor Creek) is within the adjacent Indian Creek 5th Field. Taylor Creek is a roughly 3 mile stream segment listed independently from the remaining watershed. The initial study plan was to include Taylor Creek within the same panel of sites as the North Fork. Three sites from the Master Sample located on Taylor Creek were identified for sampling. These three sites represent all of the available Master Sample sites on Taylor Creek. Two sites (the upper two) were on USFS land with the lower site on private property. Under this plan, no independent determination of impairment would have been possible for Taylor Creek. EMAP data is most appropriately used at a population rather than a single site scale. The two or three sites available on Taylor Creek would not have provided the necessary statistical power to evaluate sediment and habitat impairment. A census would have been necessary, which was outside the scope of the project for 2007.

Operational constraints also played a role in the decision to postpone sampling in Taylor Creek. During 2007, permission was not granted to access the private site, or to pass through the stream channel to access the upper sites. Road access to the upper Taylor Creek basin is limited, making access impossible within the logistical constraints of the 2007 field work. Additionally, time constraints had reduced the total scope of field work during the 2007 field season from 30 sites to 22. For these reasons, a decision was made by the SWC following consultation with Demeter Design to postpone sampling in Indian Creek and apply those sites to the North Fork Population. Based on similar patterns of land use and ownership, the existing 303(d) listing, and clear similarities in channel morphology in the lower watershed, a new plan was formulated to address the Indian Creek Watershed as a whole in a subsequent field season with a separate 30 site sample. This strategy of evaluating impairment at a watershed scale is consistent with the existing Siuslaw Sediment Sampling Plan and ongoing discussions with the ODEQ.

All sites will be evaluated based on the approach used in the previous sediment assessment of the Nestucca (Mico & Mico 2007) and the EMAP field manual (Peck et al). Field work will be completed for the Indian Creek Panel during 2008. Taylor Creek will be evaluated to the degree possible at an individual level as well as at a population level. In general, EMAP data is not sufficiently precise to draw meaningful conclusions from single sites. If the data indicate possible impairment but lack the statistical power to precisely characterize a subpopulation, additional long term monitoring may be recommended.

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

Site Selection:

Sites were selected from the “Master Sample” produced by the EPA research lab in Corvallis OR (see attachment). The “Master Sample” was developed in support of statewide efforts to coordinate monitoring efforts. It is a statewide panel of random sites drawn from the National Hydrography Database Plus (NHDPlus) using the General Random Tessellation Stratified (GRTS) algorithm (Stevens & Olsen 2004). It contains thousands of sites seeded at 1 km intervals along the stream network. By utilizing a subsection of the master panel, the data collected in this study can now be easily integrated into regional assessments and future monitoring. ODEQ staff has indicated their preference for use of the Master Sample (Doug Drake, ODEQ, personal communication).

Sites were clipped from the statewide “Master Sample” using the Indian Creek and Big Elk 5th HUC Polygons. The geology was evaluated using existing geology data layers obtained from the Siuslaw National Forest (USFS – see the Reference section for the URL). The watershed is dominated by an erodible lithology, with Tye Formation the dominant geologic type. For this reason the samples were not stratified based on lithology. It is anticipated that the appropriate reference sites for these watersheds will primarily be erodible sites within the Coast Range Ecoregion III.

Sites will be stratified by stream order if needed to balance 1st and 2nd + order streams (based on the NHD+) in the Big Elk. This was unnecessary in Indian. It was observed that 1st order streams on the NHD+ are generally 3rd or even 4th order based on the stream network defined in the CLAMS or BLM hydro coverages. This should be considered when interpreting the results of the study. Sites will be re-weighted during analysis to account for all changes in the sample frame and study design. Field truthing will be conducted to identify portions of the stream network which are too deep to sample. Subsequent modifications will be made to the GIS layers identifying site locations. A description of this process will be included in the final report.

Site Visitation Protocol:

The overall objective for is to collect data from a total of 30 sites. Additionally, all three sites on Taylor Creek will be visited as access allows (all 1st order). The “DESIGN_NO” attribute reflects the relative order in which sites should be visited. An additional attribute “INDIAN_ID” or “Siuslaw_ID” was added to the GIS layer which details the relative order (from 1 to 99 for Indian and 1 to 90 for the Big Ek) based on the “DESIGN_NO” attribute. Stratification by stream order was not necessary in Indian due to the natural distribution of sites. 29 sites were visited in 2008, including two on Taylor. The third Taylor site was on private property, and permission could not be established.

Modifications will be made to the sampling plan as needed to account for GIS data errors, denial of access, or potential changes to the overall study objectives. Where sites do not coincide with the field determined location of the stream channel (due to the resolution of the NHD+), the final location will be decided by following the natural downhill course of water to the observed channel. The modified location will be recorded in the field on a site map.

Field Parameters

Measurements collected will include:

- 1) bankfull width & height
- 2) thalweg depth profile
- 3) pebble count (at wetted and bankfull width for 2009 sites)
- 4 slope
- 5) habitat units
- 6) large woody debris volume

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

- 7) shade
- 8) bank condition

Field personnel will also make visual observations of water clarity and accumulations of sediment in the studied reach, as well as general observations of land use and stream condition. Sediment size (ie the pebble count) will be measured using a ruler. Each site will be photodocumented. Pebble counts will be taken across both the wetted and bankfull width for sites sample during 2009. The results will be compared during analysis.

A7. Measurement Quality Objectives

For all data and information collected and analyzed by field staff, all quality assurance/quality control (QA/QC) procedures outlined in the DEQ Laboratory Quality Assurance Manual (1998) and the DEQ Laboratory Watershed Assessment Section Mode of Operations Manual (MOMs, 2004) will be followed as applicable to the parameters described in this SAP.

The effects of measurement error on the data can be evaluated directly during the analysis phase using Monte Carlo modeling approach. Please refer to Sediment, Shade, and Complexity (Mico & Mico 2007) for an example of this approach. Resampling 10% of the sites will not return statistically meaningful results on QA/QC.

A8. Training Requirements and Certification

Field crews need to be trained on the equipment and methodology for EMAP Physical Habitat Characteristics, data form completion, and field instruments used. Crews will preferably be local contractors/staff with backgrounds in stream survey methodologies.

A9. Documentation and Records

Section A9 of the QAPP for this project identifies documents and records to be retained by the DEQ. Additional requirements are as follows:

- As outlined in the DEQ Laboratory Field Sampling Reference Guide (1998), field staff will prepare field data sheets prior to field measurement events. All forms used for EMAP protocols are presented in EMAP-Western Pilot Field Operations Manual for Wadeable Streams, Section 7 (Physical Habitat Characterization), Rev. 1, April 2001.
- Most data will be taken using digital PDAs. When necessary, separate field data sheets (Rite in the Rain) will be maintained for each sampling event. Information recorded on data sheets is to include: Project name, data and time of sampling event, water body name, and site ID. Each field crew will maintain the original field data sheets in a safe location as required by their Quality Assurance documents or submit the original field data sheets to the Data Manager for storage at the Lincoln Soil and Water Conservation District. These documents will be retained at the Lincoln Soil and Water Conservation District for a minimum of five years. If the District is not able to retain these documents, they will be turned over to the DEQ Regional Office in Eugene, which will maintain them for a minimum of five years from the date they were created.
- Correction to Documentation: All original data recorded in field notebooks, chain of custody records, and other forms will be written in waterproof ink. None of these documents will be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document. If an error is made on a document assigned to one individual, that individual will make corrections by crossing a single line through the error, entering the correct information and initialing the correction.

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

GROUP B: DATA GENERATION AND AQUISITION

B1. Sampling Process Design

Specific samples and field measurements to be collected at each sample site are presented in Table B1-1.

The sampling process design is a random selection of stream sites within a USGS Fifth Field Watershed to provide statistically significant data at the same scale. Sampling 30 sites per fifth field watershed is expected to provide the statistical power needed for the resulting data.

TABLE B1-1: Assessment and Analysis Planned or completed (Sites to be determined by random distribution analysis of stream systems)

LASAR No.	UTM Lat.	UTM Long.	Site Name	Stream	Crew	Parameters
	See GIS	See GIS	N. Fork Siuslaw 1	North Fork Siuslaw	Contractor	RBS
			N. Fork Siuslaw 2		Contractor	RBS
			N. Fork Siuslaw 3		Contractor	RBS
			N. Fork Siuslaw 4		Contractor	RBS
			N. Fork Siuslaw 5		Contractor	RBS
			N. Fork Siuslaw 6		Contractor	RBS
			N. Fork Siuslaw 7		Contractor	RBS
			N. Fork Siuslaw 8		Contractor	RBS
			N. Fork Siuslaw 9		Contractor	RBS
			N. Fork Siuslaw 10		Contractor	RBS
			N. Fork Siuslaw 11		Contractor	RBS
			N. Fork Siuslaw 12		Contractor	RBS
			N. Fork Siuslaw 13		Contractor	RBS
			N. Fork Siuslaw 14		Contractor	RBS
			N. Fork Siuslaw 15		Contractor	RBS
			N. Fork Siuslaw 16		Contractor	RBS
			N. Fork Siuslaw 17		Contractor	RBS
			N. Fork Siuslaw 18		Contractor	RBS
			N. Fork Siuslaw 19		Contractor	RBS
			N. Fork Siuslaw 20		Contractor	RBS
			N. Fork Siuslaw 21		Contractor	RBS
			N. Fork Siuslaw 22		Contractor	RBS
			Indian 1	Indian Creek	Contractor	RBS
			Indian 2		Contractor	RBS
			Indian 3		Contractor	RBS
			Indian 4		Contractor	RBS
			Indian 5		Contractor	RBS
			Indian 6		Contractor	RBS
			Indian 7		Contractor	RBS
			Indian 8		Contractor	RBS
			Indian 9		Contractor	RBS
			Indian 10		Contractor	RBS
			Indian 11		Contractor	RBS
			Indian 12		Contractor	RBS
			Indian 13		Contractor	RBS
			Indian 14		Contractor	RBS
			Indian 15		Contractor	RBS
			Indian 16		Contractor	RBS
			Indian 17		Contractor	RBS
			Indian 18		Contractor	RBS
			Indian 19		Contractor	RBS
			Indian 20		Contractor	RBS
			Indian 21		Contractor	RBS
			Indian 22		Contractor	RBS
			Indian 23		Contractor	RBS

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

B3. Sample Handling and Custody Procedures

NA

B4. Analytical Methods Requirements

All parameters will be measured using the protocols previously mentioned above. Specific references pertinent to this section are outlined below.

RBS

RBS will be calculated according to the most recent formulation, described in Sediment, Shade, and Complexity (Mico & Mico 2007) as well as the original formulation.

B5. Quality Control Requirements

There are no appropriate field collection requirements pertaining to QA/QC for the parameters collected and recorded for this scope of work.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Please see Section B6 of the QAPP for this project for equipment testing, inspection and maintenance requirements.

B7. Instrument Calibration and Frequency

Please see Section B7 of the QAPP for this project for equipment calibration requirements.

B8. Inspection/Acceptance Requirements

Please see Section B8 of the QAPP for this project for inspection and acceptance requirements.

B9. Data Acquisition Requirements

Please see Section B9 of the QAPP for this project for data acquisition requirements.

B10. Data Management

Please see Section B10 of the QAPP for this project for further information on data management once the electronic data has been submitted to DEQ. Data management of the resulting data will be provided through the DEQ LASAR database.

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

GROUP C: ASSESSMENT AND OVERSIGHT

C1. Assessment and Response Actions

Surveillance and data management will be performed in a timely manner to ensure that the data being collected will meet the needs of the project. All results of the individual assessments will be compiled and managed by the Data Manager.

Response actions will be developed as data becomes available. Any stop work orders or change in project scope will come from the Siuslaw Project Coordinator. Corrective actions will be documented as addendums to this SAP.

C2. Reports to Management

Reports will include the data results and evaluations of indices (RBS and MBI). RBS values will indicate either a) the population is not impaired for sedimentation or b) population is impaired for sedimentation and warrants further analysis for sediment source identification and sediment budget to enable development of a TMDL. RBS results will be evaluated against MBI results and turbidity measurements for each stream system studied. These measures will provide further indication of the degree of impairment of the studied stream and potential correlation of data.

Any results warranting a sedimentation source and budget analysis will require an addendum to this SAP to document procedures for that scope of work.

GROUP D: DATA VALIDATION AND USABILITY

D1. Data Review, Validation, and Verification

The Project Officer, QA Officer, and Data Manager will determine if the data collected meets the QA Plan objectives and will review all data resulting from this project as data becomes available. Decisions to accept, qualify, or reject data will be made by the Project Manager, QA Officer, and Data Manager.

D2. Validation and Verification Methods

Once the data has been entered into the project database and into LASAR, the Data Manager will proof a printed database report against the original field sheets. Errors in data entry will be corrected at that time. If data is collected electronically in the field, any discrepancies between that data and written field data will be brought to the attention of the Siuslaw Project Coordinator for clarification. Measurements resulting in data indices (RBS or MBI) outside expected thresholds will be examined to determine if erroneous field data may be contributing to the result. Data quality problems will be discussed as they occur and in the final report to data users.

D3. Reconciliation with Data Quality Objectives

If data quality indicators do not meet the project's specifications, data may be discarded and re-sampling may occur. The cause of the failure will be evaluated. If the cause is found to be equipment failure, calibration and/or maintenance techniques will be reassessed and improved. If the problem is found to be sampling team error, team members will be retrained. Any limitations on data use will be detailed in both interim and final reports, and

Water Quality Monitoring - MidCoast Sediment SAP Version 2.3

other documentation as needed. If failure to meet project specifications is found to be unrelated to equipment, methods, or sample error, specifications may be revised for the next sampling season. Revisions will be submitted to the QA section of the DEQ Laboratory for review and/or approval.

Appendix A - Revision History

The plan author must increment the revision number with each approved revision. A new document is assigned a revision number of 1.0. The revision number of a plan that receives routine or minor editing is updated by incrementing the minor number by one (i.e., 1.0 becomes 1.1) The revision number of a document that has undergone major revisions is updated by incrementing the major number by one and setting the minor number to zero (i.e., 1.1 becomes 2.0). Revisions to documents should be clearly identified in a "Revision History" section of the document. The Revision History documents the specific changes made to the controlled document, who made the changes, and the date (month and year) the changes were made.

Table App-1 Revision History

Revision	Date	Changes	Editor
2.2	6/4/2008	Integrated work on Big Elk and Indian	L.Mico
2.3	5/25/2009	Integrated Subcommittee Input	L. Mico