Placer County Water Agency
Middle Fork American River Hydroelectric Project
(FERC No. 2079)

DRAFT

PROPOSED 2006 AQUATIC HABITAT CHARACTERIZATION STUDY PLAN

Prepared for:

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

This plan describes Placer County Water Agency's (PCWA's) proposed approach for conducting Phase 2 of a two-part Aquatic Habitat Characterization Study (Study). The technical approaches proposed in this plan build upon information developed during 2005 (Phase 1) and represent a refinement of the methods presented in PCWA's 2005-2006 Existing Environment Study Plan Package dated June 17, 2005.

2.0 STUDY OBJECTIVES

The purpose of the study is to develop information regarding the types and distributions of aquatic habitats in the stream and river reaches in the vicinity of the Middle Fork American River Hydroelectric Project (MFP). Habitat information is important in developing an understanding of the factors that influence the distribution and abundance of fish and other stream organisms. Information developed as part of this study will be used as a basis for designing future technical studies involving aquatic resources.

3.0 GENERAL APPROACH

The Phase 2 studies proposed in this study plan are designed to augment and build upon information developed as part of the Phase 1 studies conducted in 2005. During Phase 1, aquatic habitat was mapped along the Middle Fork American and the Rubicon rivers using a combination of videography and aerial photography. The smaller streams, including Duncan Creek and Long Canyon, were not mapped due to the presence of dense vegetation, which obscured the view of the streams. The Phase 2 aquatic habitat studies will focus on refining, verifying, and expanding the mapping conducted during Phase 1, using a combination of helicopter surveys and ground surveys. In addition, aquatic habitat information will be collected along the streams that could not be mapped during Phase 1 through focused ground surveys. Detailed measurements of aquatic habitat characteristics will be collected during the ground surveys.

4.0 STUDY METHODOLOGY

The following summarizes the aquatic habitat mapping activities PCWA plans to accomplish in 2006:

- Refine habitat mapping conducted along select reaches of the Middle Fork American and Rubicon rivers using low altitude helicopter reconnaissance surveys.

- Verify and expand upon the habitat mapping information developed in 2006 for the Middle Fork American River and the Rubicon River. This effort would involve conducting focused ground truthing in representative portions of major strata selected in consultation with the resource agencies. Candidate reaches are identified in Table 1. PCWA proposes to ground-truth 20% of the total length of each Rosgen Level I channel type identified along the Middle Fork American and Rubicon rivers.

- Map aquatic habitats along the smaller tributary study streams including Duncan Creek, North and South Forks of Long Canyon Creek, and Long Canyon Creek using focused ground surveys. The ground surveys will be completed using an approach similar to the Basin Visual Evaluation Technique (BVET) (Dolloff et al. 1993). All reasonably accessible reaches in these streams will be inventoried on the ground. All habitat units will be classified to habitat type and the length of each unit will be measured. PCWA proposes to measure detailed habitat characteristics along 20% of each habitat type (i.e. every fifth unit of each habitat type).

- Complete detailed aquatic habitat mapping at every geomorphic and riparian quantitative study site to provide continuity of information.

- Assess, in consultation with the resource agencies, if stream reaches upstream of the Project facilities might serve as potential comparison reaches. If appropriate, map aquatic habitat within comparison reaches.

- Prepare a report documenting the 2006 aquatic habitat mapping results.

The methods associated with each of these activities are described in the following subsections.

4.1 REFINE PHASE 1 HABITAT MAPPING

During 2005, habitat mapping was completed along the Middle Fork American River from French Meadows Dam to the confluence with the North Fork American River, and along the Rubicon River from Hell Hole Dam to the confluence with the Middle Fork American River, using a combination of aerial photography and low altitude aerial videography. The results of this effort are described in the 2005 Aquatic Habitat Characterization Study Report dated January 30, 2006. The visual classification information developed during Phase 1 will be refined in 2006 by conducting low altitude helicopter surveys. Any modifications to the original habitat classifications will be recorded on maps and aerial photographs and will be documented in the 2006 Study Report.

4.2 VERIFY AND EXPAND UPON THE PHASE 1 HABITAT MAPPING

After refining the Phase 1 habitat mapping by helicopter survey, focused ground surveys will be conducted to verify and expand upon the aquatic habitat mapping information. PCWA proposes to ground-truth 20% (by length) of each Rosgen channel type identified in the Middle Fork American and Rubicon rivers.

Within each Rosgen channel type, contiguous lengths of streams will be ground-truthed for efficiency, to the extent feasible. The selection of lengths to be ground-truthed will be based on accessibility and consultation with the resource agencies. Survey methods will follow those described in PCWA's 2005-2006 Existing Environment Study Plan Package dated June 17, 2005, and provided in Appendix A.

4.3 MAP AQUATIC HABITAT ALONG STREAMS NOT SURVEYED DURING PHASE 1

Existing aerial photography and low altitude aerial video could not be used to map habitat along the smaller streams mainly due to the presence of dense vegetation, which obscures the view of the stream. Accordingly, PCWA will conduct ground-based surveys along the smaller streams, including:

- Duncan Creek
- North Fork Long Canyon Creek
- South Fork Long Canyon Creek
- Long Canyon Creek

PCWA proposes to utilize a habitat assessment approach similar to BVET (Dolloff et al. 1993). All reasonably accessible reaches in these streams will be inventoried on the ground as indicated in Table 1. All habitat units will be classified to habitat type and the length of each unit will be measured. This approach will provide the location and length of each habitat unit.

In addition, PCWA proposes to take detailed measurements of 20% of the habitat units along each reach following methods described in PCWA's 2005-2006 Existing Environment Study Plan Package dated June 17, 2005, and provided in Appendix A. Units to be measured will be selected by systematic sampling of the first unit of each habitat type, followed by the fifth unit of that type and every succeeding fifth unit. Detailed information from a minimum of 10 units of each major habitat type (representing 5 or more percent of each reach) will be collected, if present within the survey area.

4.4 CONDUCT DETAILED MAPPING OF AQUATIC HABITAT AT GEOMORPHIC AND RIPARIAN QUANTITATIVE STUDY SITES

Detailed ground surveys will be completed at each geomorphic and riparian quantitative study site following the methods provided in Appendix A. Field measurements will be collected in each habitat unit included in the geomorphic and riparian quantitative study sites. One hundred percent of the length of each quantitative geomorphic and riparian study site will be surveyed. This will allow more detailed assessment of factors affecting aquatic habitat and will provide continuity of data between the studies. Candidate locations for those quantitative study sites are identified in Table 1. Final locations for the quantitative study sites will be established in consultation with the resource agencies, as described in the geomorphic and riparian Phase 2 study plan.

4.5 ASSESS AND MAP POTENTIAL COMPARISON STREAMS

It may be necessary to compare aquatic habitat between the study streams and other streams, such as unregulated streams upstream of Project diversions (and reservoirs). In order to evaluate the usefulness of unregulated streams as reference sites for study

streams, it is important to understand their similarities and differences. Physical habitat resulting from geomorphic characteristics and hydrologic conditions can affect aquatic biota and riparian communities. These characteristics may result from underlying geomorphic and hydrologic differences in addition to differences that may be attributable to Project presence and operations.

PCWA proposes to consult with the resource agencies regarding the selection of possible reference reaches, study goals and objectives as they relate to the selection of reference reaches, study methodologies, and evaluation criteria. PCWA plans to begin these discussions as the resource agencies are reviewing the Phase 2 study plans.

5.0 DATA REDUCTION AND WORK PRODUCTS

Field data will be entered into a database, where data will be stored by stream, reach, channel type, and river mile. Habitat classifications and detailed measurements will be associated with each habitat unit. All data entered in the database will be checked against the original field data sheets for quality control purposes. Data contained in the database will be provided in Excel format. Ground-truthing locations and overlap with geomorphic and riparian study sites will be mapped using Geographic Information System (GIS).

Tabular and graphical summaries of habitats and habitat measurements by stream, reach, and channel type will be produced. Summaries of habitats will be provided by length and frequency. These will include summaries of pool depths, spawning gravel, dominant and subdominant substrates, woody debris, barriers, and other measured parameters. Data and data summaries also will be produced as GIS layers depicting the locations of significant spawning gravels, woody debris, and unusual features or observations of biota of interest.

Photographs will be associated with habitat locations or coordinates and stored electronically.

6.0 REPORTING

A report describing the results of the Phase 2 aquatic habitat studies will be prepared. The report will provide a description of the study objectives, methods, and results. All work products described in this study plan will be incorporated into the report, with text descriptions, tables, graphs, and photographs, as appropriate. In addition, for perspective, the report will include a discussion of recent climatic and hydrologic conditions prior to and during the period of study.

The report and data will be made available to the resource agencies on CD with text descriptions, tables, graphs, and photographs, as appropriate. All study measurement sites will be identified on a base map. GIS layers will be provided on a common base map and provided on CD to the identified GIS contact at each agency. All data will be provided in raw format on an accompanying CD.

7.0 NEXT STEPS

This study plan presents PCWA's proposed approach for conducting Phase 2 of the Aquatic Habitat Mapping Study. PCWA recognizes that it is important to obtain consensus on these approaches with the resource agencies prior to proceeding with the studies. The following are key decisions that are needed prior to implementing the work outlined in this study plan.

- Obtain consensus on the overall study plan approaches described in this study plan;
- Obtain consensus on the location and extent of ground surveys to be performed to verify habitat mapping on the Middle Fork American and Rubicon rivers completed during Phase 1;
- Obtain consensus on survey approaches for small tributary streams; and
- If appropriate, identify potential comparison reaches for additional surveys in consultation with the resource agencies.

PCWA plans to discuss these topics with the resource agencies during a meeting scheduled for June 1, 2006, with the goal of obtaining concurrence on the study approaches and methods outlined in this study plan. With consensus from the resource agencies, PCWA will proceed with the Phase 2 studies.

PCWA will develop a schedule showing the dates during which fieldwork is expected to be conducted and will provide the resource agencies with monthly updates throughout the 2006 field season. The field schedule will be provided to specific individuals identified by the resource agencies. PCWA will coordinate with these individuals as the field schedule evolves and specific field dates are identified and refined. PCWA encourages and looks forward to participation by the resource agencies in the field work.

8.0 SCHEDULE MILESTONES

The 2006 studies (Phase 2) will be carried out in accordance with the following proposed schedule.

Proposed 2006 Schedule

Date	Milestone
May - June 2006	Consult with agencies regarding Proposed Phase 2 study plan and methods.
July -Aug 2006	Refine habitat mapping conducted along select reaches of the Middle Fork American River and Rubicon River using low altitude helicopter surveys.
July 2006	Consult with resource agencies regarding the selection of reaches for focused ground surveys and potential comparison streams.

Date	Milestone
Jul-Oct 2006	Verify (ground truth) and conduct detailed mapping of the Middle Fork and Rubicon Rivers, along reaches selected in consultation with the resource agencies.
Jul-Oct 2006	Map aquatic habitats along smaller streams that were not mapped during Phase 1.
Jul-Oct 2006	Complete detailed mapping at quantitative riparian and geomorphology study sites.
Aug - Oct 2006	Map aquatic habitat within comparison streams, if determined to be appropriate.
Sept - Nov 2006	Data tabulation, reduction and preliminary analysis.
Oct – Dec 2006	Report preparation
Jan 2007	Distribute report to resource agencies for review and comment.

9.0 REFERENCES

Dolloff, C.A., Hankin, D.G., and G. H. Reeves. 1993. Basinwide Estimation of Habitat and Fish Populations in Streams. General Technical Report SE-83. USDA Forest Service. Southeastern Forest Experiment Station P.O. Box 2680 Asheville, North Carolina 28802.

US Forest Service Region 5 (USFS R5). 1996. Pacific Southwest Region Stream Condition Inventory Version 3.4 (6/27/96). USFS Region 5, Vallejo, California.

TABLE

Table 1. Candidate Reaches for Aquatic Habitat Ground-Truthing and Ground Surveys.

River	Reach	Rosgen Classification[1]	Downstream River Mile Station	Upstream River Mile Station	Length	Accessibility	Access Points[2] (RM)
Large Streams							
Middle Fork American River	NF American River to Ralston Afterbay	F	0	9.6	9.6	Easy	0.1, 2.5, 4.2
		F or B	9.6	10.8	1.2	Easy	10.8
		F	10.8	24.7	13.9	Easy	10.8
	Ralston Afterbay to MF Interbay	Fb	25.7	26.1	0.4	Moderate	25.9
		Fb or B	26.1	27.7	1.6	Moderate	25.9
		F or B	27.7	29.1	1.4	Moderate	27.7
		Fb	29.1	33.4	4.3	Moderate-Diff	29.4
		Fb or B	33.4	35.6	2.2	Easy-Moderate	34.5
	MF Interbay To French Meadows Dam	F	35.6	36	0.4	Easy - Boat	35.6
		Fb or G	36	36.5	0.5	Easy - Boat	35.6
		A	36.5	37.4	0.9	Inaccessible	35.9
		Fb or A	37.4	39.7	2.3	Inaccessible	35.9
		A	39.7	42	2.3	Difficult	45.8
		B	42	44.2	2.2	Moderate	45.8
		A	44.2	47.2	3	Moderate-Diff	45.8
Rubicon River	Ralston Afterbay To Long Canyon Creek	G	0.3	0.8	0.5	Easy-Moderate	0.5
		F	0.8	2.1	1.3	Easy-Moderate	0.5
		F or G	2.1	3.3	1.2	Easy-Moderate	3.1, 3.4
		F	3.3	3.7	0.4	Easy-Moderate	3.4
	Long Canyon Creek to SF Rubicon River	G	3.7	4.4	0.7	Moderate-Diff	3.4
		F	4.4	5.6	1.2	Moderate	5.3
		G	5.6	6.1	0.5	Moderate	5.3
		F or G	6.1	8.7	2.6	Moderate	8
		G	8.7	13.5	4.8	Moderate	9.5
		F or G	13.5	14.6	1.1	Moderate-Diff	14.3
		G	14.6	17.6	3	Moderate-Diff	14.3
		F or G	17.6	19.7	2.1	Moderate	20.25
		F	19.7	21.9	2.2	Partially Accessible	21.2
		G	21.9	22.5	0.6	Inaccessible	21.2
	SF Rubicon River to Hell Hole Dam	F or G	22.5	23.4	0.9	Moderate	22.6
		F	23.4	24.2	0.8	Inaccessible	25
		G	24.2	24.7	0.5	Inaccessible	25
		F or B	24.7	27.5	2.8	Moderate	25.0, 25.3
		B	27.5	30.3	2.8	Moderate	28.7, 30.3

[1]Reaches are defined by breaks in Rosgen Level I channel classification within stream segments defined by hydrologic or Project features.

[2]Reaches in blue text indicate accessibility is unknown (accessibility will be determined during field inspections). Reaches in red text are inaccessible and will not be sampled unless field conditions indicate better access.

Table 1. Candidate Reaches for Aquatic Habitat Ground-Truthing and Ground Surveys (continued).

River	Rosgen Classification[1]	Downstream River Mile Station	Upstream River Mile Station	Length	Accessibility	Access Points (RM)
Small Streams						
Duncan Creek	A	0	1	1	Possibly Accessible	0.10
	B	1	3.1	2.1	Inaccessible	3.20
	G	3.1	4	0.9	Difficult	3.20
	B or G	4	5	1	Moderate	5.90
	B	5	7.9	2.9	Moderate-Easy	5.9, 7.4
	B or G	7.9	8.6	0.7	Easy	8.70
Long Canyon	A	0	7	7	Possibly	6.8, 3.4
	B	7	11.4	4.4	Moderate-Diff	8.60
NF Long Canyon	B	0	3.1	3.1	Easy-Moderate	1.4, 2.6, 3.1
SF Long Canyon	B	0	3.3	3.3	Easy-Moderate	0.4, 1.8, 3.3

[1]Reaches are defined by breaks in Rosgen Level I channel classification

APPENDIX A

Survey Methods

Introduction

PCWA proposes to develop detailed aquatic habitat information at select locations along the Rubicon River, the Middle Fork American River, and along the smaller streams, including the South Fork and North Forks of Long Canyon, Long Canyon and Duncan Creek. In general, detailed aquatic habitat information will be developed along 20 percent of each candidate reach, except in those locations where quantitative riparian and geomorphology study sites are established. In these cases, 100 percent of the quantitative study site will be surveyed. The detailed aquatic habitat information will be developed in accordance with the methods originally presented in PCWA's 2005-2006 Existing Environment Study Plan Package dated June 17, 2005, and further described below.

Habitat Classification

During Phase 1, habitats were classified by using two sets of criteria, Hawkins *et al*. (1993) and McCain *et al*. (1990). This same approach will be utilized for visual assessments in 2006. The Hawkins *et al*. (1993) mesohabitat typing yields a general view of the quantity of aquatic habitats available and is generally more amenable to visual classification than other approaches. Hawkins *et al*. (1993) outlines a hierarchy for types of aquatic habitats as summarized in (Table A-1). As indicated, the aquatic habitats are first divided into fast and slow water types. Second, the fast water types are grouped into turbulent or non-turbulent types. Slow water types are further grouped into dammed pool or scour pool types.

Table A-1. Hawkins *et al*. (1993) Level I and Level II Habitat Classifications.

Fast Water (Riffle/Run)		Slow Water (Pool)	
Turbulent	**Non-Turbulent**	**Scour Pool**	**Dammed Pool**
Riffle Habitat – High Turbulence – Caused by geomorphological differences (i.e. gradient, bed roughness, and/or step development	Run Habitat - Non-Turbulent - Caused by geomorphological differences (i.e. gradient, bed roughness, and/or step development	Pool Habitat – Formed by Scour - Pool created by erosion of stream bank, boulder, bedrock, etc.	Pool Habitat - Formed by Dam - Pool created by water blockage due to debris, landslide, beaver dam, large boulders, etc.

The USFS Fish Habitat Relationships Technical Bulletin (McCain *et al*. 1990) (Table A-2) uses a more detailed level of habitat typing than provided by Hawkins *et al*. (1993). McCain *et al*. (1990) outlined procedures to inventory fish habitat using riffle, run and pool habitats as the three primary categories of habitat found in stream channels. Riffle and run habitats fall into the turbulent and non-turbulent categories described by Hawkins *et al*. (1993). Pool habitats are described by their position and cause of their formation; they are either dammed pool habitats or scour pool habitats.

Table A-2. Habitat Types and Codes Adapted from McCain *et al*. (1990).

Riffle	
Low Gradient Riffle	LGR
High Gradient Riffle	HGR
Cascade	
Cascade	CAS
Bedrock Sheet	BRS
Flatwater	
Pocket Water	POW
Glide	GLD
Run	RUN
Step Run	SRN
Trench Chute	TRC
Edgewater	EGW
Pool	
Main Channel Pool	MCP
Lateral Scour Pool	LSP
Corner Pool	CRP
Secondary Channel Pool	SCP
Dammed Pool	DPL
Backwater Pool	BWP
Step Pool	SPO
Plunge Pool	PLP
Channel Confluence Pool	CCP
Additional Unit Designations	
Dry	DRY
Road-Crossing	RDC
Concrete Box Culvert	CBC

Habitat types will be classified in the field according to both classification schemes. Habitat lengths and widths will be measured to the nearest foot using a hip-chain for length and a stadia rod or tape for widths. The mean and maximum depth of each habitat type will be measured to the nearest 0.1 feet with a stadia rod for depth of less than 20 feet. A hand held depth finder or a weighted marked rope will be used to measure depths in excess of 20 feet.

Substrate Classification

During the habitat mapping surveys, the stream channel substrate will be characterized and recorded by the field team. In each mesohabitat, the percent distribution of different size classes of substrate will be visually estimated to the nearest 10%. Streambed substrate classes will be grouped as follows:

- Fines (organic material)
- Fines (silt/clay), <0.062 mm;
- Sands, 0.062 - 2 mm;
- Gravels, 2 - 64 mm;
- Cobbles, 64 - 256 mm;
- Boulders, 256 - 4096 mm; or
- Bedrock.

A sand card will be carried by each field team to aid in the classification of sand and fine materials. Substrate characteristics associated with each mesohabitat will be recorded on datasheets.

Spawning Gravel

Spawning gravel, including gravel present in small pockets, will be measured as the estimated amount (square feet) of spawning-sized gravel (0.25-3.0 inches diameter, adapted from Bjorn and Reiser (1991)) occurring in each mesohabitat. In addition, habitat areas with spawning gravel will be assigned a "Spawning Quality" score of "Poor, Fair, Good, or Excellent." The score will be based primarily on substrate composition, since much of the mapping will be conducted during the summer months when streamflow will be low. The quality of spawning gravel will be characterized based on the angularity of the gravels and embeddedness. Gravels of higher suitability for use by spawning trout are highly rounded. Gravel that is more angular is considered of lower quality for spawning. Generally, a "Good" or "Excellent" score will be assigned to rounded spawning gravels with little sand and fines present and low embeddedness. Spawning gravels with high embeddedness and a high proportion of sand will receive a "Fair" or "Poor" score, regardless of angularity. The scoring criteria are presented in Table A-3.

Table A-3. Description of Spawning Gravel Quality.

Spawning Quality	Description of Substrate
Excellent	Round-shaped spawning gravels loose in substrate.
Good	Round-shaped spawning gravels slightly embedded in substrate or moderately jagged-shaped spawning gravels loose in substrate.
Fair	Round-shaped spawning gravels embedded in substrate or moderately jagged-shaped spawning gravels slightly embedded in substrate.
Poor	Round or jagged-shaped gravels deeply embedded in substrate.

Wolman Pebble Counts

Wolman pebble counts will be performed at stream segments encountered during the mesohabitat mapping effort. This effort will focus on reaches with substrates that are different from those surveyed as part of the Phase 2 geomorphology studies.

Stream Bank Erodability

Stream bank erodability will be visually estimated in one of four categories: zero, low, medium or high. A score will be assigned to the stream banks of each habitat. Zero will be typically assigned to stream banks that have very low erodability, such as bedrock. Low and medium scores will be assigned to stream banks that have good bank structures, such as an intact riparian zone or boulder/cobble dominated bank. High scores will be assigned to stream banks that are very unstable; such as sand dominated stream banks.

Vegetation

Riparian habitat information will be developed including a description of the dominant vegetation covering the stream banks. Vegetative groups will include no vegetation, grasses, shrubs, deciduous trees, coniferous trees, and mixed trees. Stream bank vegetation will be characterized by the percentage category of stream bank covered by vegetation. The categories recorded will be: zero, 1% - 25%, 25% - 50%, 50% - 75%, and 75% - 100%. Specific information related to aquatic habitat (e.g. shade) will be developed by an aquatic biologist and will be measured to the nearest 10% using a spherical densiometer. Riparian graminoids will be mapped as part of the aquatic habitat characterization study and as part of the riparian habitat mapping study. Presence and absence of graminoids and approximate cover will be estimated along each stream bank within each habitat unit as part of this study element. Graminoid mapping will only be conducted along larger rivers where hardhead are known or expected to reside.

Graminoids

Riparian graminoids will be mapped as part of the aquatic habitat characterization study and as part of the riparian habitat mapping study. Presence and absence of graminoids and approximate cover will be estimated along each stream bank within each habitat unit as part of the aquatic study element. Graminoid mapping will only be conducted along larger rivers where hardhead are known or expected to reside.

Large Woody Debris

Large woody debris will be counted in each stream habitat unit. The woody debris data will be collected according to the Stream Condition Inventory by Region 5, USFS. According to this protocol, the length of all downed wood recorded would be at least one-half bankfull width and recorded if any part lies in the bankfull channel. Any woody debris over 0.1 meter in width will be recorded. An example of the inventory sheet is

provided in Table A-4. In the case of debris jams or other accumulations of wood, all pieces of wood meeting the criteria will be counted.

Potential Fish Barriers

Potential fish passage barriers will be visually assessed and characterized by experienced fish biologists. These will include culverts, road crossings, debris jams, cascades, bedrock sheets, shallow riffles, and dewatered areas, among others. Additionally, a visual assessment of potential fish passage barriers at the mouths of tributaries will be conducted. Photographs will be taken and spatial coordinates collected using GPS for each of the barriers identified during the ground surveys. Crews also will identify the location of prominent features, such as tributaries, gaging stations, diversions, recreational facilities and other facilities with GPS coordinates.

Tributary Flow and Temperature

Field crews will estimate flow in tributaries that are encountered during the habitat mapping ground surveys. Specifically, field crews will measure stream width, and take three measurements of depth and velocity of each flowing tributary immediately upstream of the confluence with the stream being mapped. A General Oceanographics™ current meter, or other small velocity meter, will be used to take the three timed current measurements across the wetted channel. Spot measurements of water temperature will be taken with a standard thermometer.

Incidental Observations

Incidental observations of fish, wildlife, and amphibians will be recorded on maps and in notebooks, along with GPS coordinates. Photographs of amphibians or reptiles will be taken, when the species cannot be identified by sight.

Organic Material

The presence of instream organic material, particularly filamentous algae, will be documented, when observed. Samples of fine organic materials observed in the field will be sampled and preserved with alcohol for later analysis, if necessary. Decisions regarding the need for sample analysis will be made in consultation with the resource agencies.

Table A-4. Exampe of Woody Debris Inventory Data Sheet from USFS R-5 (1996) Stream Condition Inventory.

Stream Condition Inventory-Field Intensive
Pass 1 Sensitive Reach "LWD/Pebble Counts"

Measurements in Metric Units

Page ___ of ___
Sensitive Reach ID# _____

Stream: _____
Forest: _____
Use back of form to describe Sensitive Reach Start

Date: _____
Crew: _____

Cross Section Candidate Sites (Circle 3 Randomly Selected Sites)

Site #												
Distance												

Bankfull Width: _____ Min. Debris Length (=1/2 average bankfull width): _____

Woody Debris Tally (Dead and Downed Wood)

Length Class (m)		Diameter Class (m) (D 1) 0.1 to 0.2		(D 2) 0.2 to 0.4		(D 3) 0.4 to 0.8		(D 4) 0.8 to 1.6		(D 5) > 1.6	
(L 1)	< 1										
(L 2)	1 to 2										
(L 3)	2 to 4										
(L 4)	4 to 8										
(L 5)	8 to 16										
(L 6)	16 - 32										
(L 7)	> 32										
Aggregate Tally								Total Aggregates			
								Total Pieces of Wood in Aggregates			

Pebble Count Tally (Secondary Axis in mm)

Sands	Gravels					Cobbles		Boulders	Bedrock
<2	2 to 4	4 to 8	8 to 16	16 to 32	32 to 64	64 to 128	128 to 256	>256	
Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10

Identification of Survey Segment

A. Sensitive Reach Length (m) _____ B.. A minus 1000m _____ (if A is greater than 1000m)
C. Random # between 1 and B _____
D. Survey Segment lies between C (Survey Segment Start) _____ and 1000+C (Survey Segment End) _____

Comments:

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