

APPENDIX A: Description of data codes and analyses using the program TTS Adjuster to interpret .flo files (raw TTS data).

This document contains plots from *ttsAdjuster* and *R*, the commands used in *R*, and user comments. Since this document was constructed from the file of *R* commands, comments are preceded by “#”. The # tells *R* that the following text is not a command, allowing the user to include comments easily within the record of commands.

#The *R* commands below read the .flo file and the .lab file into *R*, and then merge the two files together for use in *R*.

```
vdc07.flo <- read.flo("vdc",07)
vdc07.lab <- read.lab("vdc",07)
vdc07.sed <- merge.flo("vdc",07)
```

#The format to describe each period within *R*, is:

```
Start date, start time, end date, end time
YYMMDD,HHMM,YYMMDD,HHMM
```

#The plots of the stage and turbidity for each period are created using *ttsAdjuster*. Raw stage is in black, corrected in blue. Raw turbidity is in teal, corrected in red.

#The data “dump” number, and the sample bottle numbers appear on this line for each period, in the format of “dump number: bottle numbers”.

#comments are left by the user regarding the ‘quality’ of the turbidity data. Since the combination of turbidity data and sample bottle ssc’s (suspended sediment concentrations) are the basis for most sediment load estimates, the turb data quality is very important. If the turbidity data have been heavily adjusted, a certain amount of doubt is introduced regarding the quality of the estimate produced using those data.

#Comments by the user on problems, special circumstances, or notes of interest appear at the beginning of each period in this document. The abbreviations “dd” or “dd’s” are used frequently to refer to data dump or dumps.

APPENDIX B: Adjustments made to Raw Data collected at the Cummings Creek TTS Station, HY07.

VDC 07

Notes on adjustments made by Sarah Wilson to stage and turbidity data (vdc07.flo) using ttsAdjuster

DATE, TIME	STAGE DATA	TURBIDITY DATA
061201		ISCO installed
070124,1840		OBS-3 installed, data start FF note: "OBS-3 too shallow, Jessie tries to dig out"
070203, 1630	New pressure transducer installed. Previous stage data adjusted to match new.	
070210,1020 to 070211,0100		Data coded as bad. FF note on Feb 11 at 1610 states: possible boom out of water, turbidity spikes" I assume referring to the period now coded bad.
070221,0010 to 070223,1530	Stage shifted down to match FF note on 2/23 regarding change in stage offset.	
070221,1020 to 070222,0620		Turb data flat during high flow period, coded as bad.
070223, 1500		Spike due to visit removed, data immediately prior to visit adjusted slightly to match.
070225,0140 to 070226,0300		Data questionable: turbidity reading seems very low compared to expected at this stage. Also scatterplot of RAW turb:ssc shows no pattern. No indication of problem with samples in lab codes. Three large unrealistic looking spikes removed, improves turb:ssc, adjusted data still questionable.
070309,1750		Small spike removed, not realistic, caused by one data point only.
070328,1040		Small downward spike removed.
070410,1720 to 070410,1800	Data missing due to battery change: interpolated.	Data missing due to battery change: interpolated.
070408,0100 to 070414,1250	Data adjusted to reflect change in stage offset on 4/14 and field form data on 4/10.	

DATE, TIME	STAGE DATA	TURBIDITY DATA
070430,1250 to end of hy on 070617, 1240	Stage data showing large amount of semi-regular fluctuation. Was not seen at start of HY or at any other time. Data questionable.	
070605,0250 to 070606,1440		Large amount of spiking removed by interpolation.
070617,1240	END HY07	

APPENDIX C: Adjustments made to Raw Data collected at the Cummings Creek TTS Station, HY08.

Notes on adjustments made by Sarah Wilson to stage and turbidity data (vdc08.flo) using ttsAdjuster

DATE, TIME	STAGE DATA	TURBIDITY DATA
071019,0930	data begin	data begin
071023,1610 to 071030,1610		Large period of bad turbidity interpolated at 0 ntu rather than coding as bad. There is no reason to think turbidity was (significantly) anything different from zero for that period.
071110		Field form notes t-probe was unstable and touching bottom (?) below 0.1 ft stage, explains period of bad turb above.
071203,1450 to 071204,0600		Turb data bad/missing. Field form Dec 16 indicates creek bed was “highly embedded with sand” influx of sediment may have pushed boom out of water or otherwise interfered with data.
071206 to 071210	Data unusually spikey but look otherwise normal, will code as good despite spikiness.	Data unusually spikey but look otherwise normal, will code as good despite spikiness.
071218,0620 to 071218,1940		Data bad/missing. FF indicates “raft of ferns and leaves on boom forcing probe out of water”, presumably removed during visit Dec 18 at 1930
071219 to 071226	Several offset sections of stage data corrected.	
071226,0120 to 071229,0020		Data excessively spikey, FF note Dec 27 “air bubbles in turbulence may be triggering bottle dumps”. Data coded as “questionable” for this period.
080104,0150 to 080104,1110		Data bad/missing
080104	STAFF PLATE DESTROYED	
080108, 0000-1000		Small spikes removed
080111 to 080112		Small spikes removed
080127,1600		Lg spike removed
080129	NEW STAFF PLATE	
080130,2200 to 080201,0930		Turb data bad/missing
080203,0230 to 2240		Turb data bad/missing

DATE, TIME	STAGE DATA	TURBIDITY DATA
080206 to end of HY 2008	Difference between observed v. e-stage may be due to new staff plate. Consistent until end HY.	
080210,1410 to 080213,1630		Data bad. Since very low flow, replaced with interpolated straight line.
080225 to 080228		Turb data fouled, some larger spikes removed but data still not great.
080302 to 080305		Data fouled, interpolated to straight line
080310 to 080314		Data bad/missing. Not really savable since period of bad data is long with fluctuations in flow during that time.
080317 to 080319	Stage appears to have dropped for this period, adjusted up.	Data bad/missing. Not really savable since period of bad data is long with fluctuations in flow during that time.
080321 to 080327		Data bad/missing. Not really savable since period of bad data is long with fluctuations in flow during that time.
080407 to 080426		Bad/missing
080502 to 080509		Bad/missing
080509 to end		Data have large spikes, removed by interpolation and data classified as “good”.
080530, 1650	End data	End data

APPENDIX D: Water Quality Grab Sample Field Form.

Location _____ Sampled by _____ Date _____
 Rain start time_ Current Weather_____ Time _____
 Peak Stage _____ Current Stage _____ ID # _____
 Culvert size _____ Culvert Flow Depth _____ Culvert invert _____
 High velocity width _____ Low velocity width _____ RISING
 Dist #1 _____ Time #1_ Dist #1 _____ Time #1_____ OR
 Dist #2 _____ Time #2_ Dist #2 _____ Time #2_____ FALLING
 Dist #3 _____ Time #3_ Dist #3 _____ Time #3_____ STAGE?
 Sketch map of high and low velocity strands: Sketch cross-section of channel: R F

TUM # _____
 Turbidity _____
 Measured by_
 Date/Time_

NTUs

Comments:

Location _____ Sampled by _____ Date _____
 Rain start time_ Current Weather_____ Time _____
 Peak Stage _____ Current Stage _____ ID # _____
 Culvert size _____ Culvert Flow Depth _____ Culvert invert _____
 High velocity width _____ Low velocity width _____ RISING
 Dist #1 _____ Time #1_ Dist #1 _____ Time #1_____ OR
 Dist #2 _____ Time #2_ Dist #2 _____ Time #2_____ FALLING
 Dist #3 _____ Time #3_ Dist #3 _____ Time #3_____ STAGE?
 Sketch map of high and low velocity strands: Sketch cross-section of channel: R F

TUM # _____
 Turbidity _____
 Measured by_
 Date/Time_

NTUs

Comments:

Location _____ Sampled by _____ Date _____
 Rain start time_ Current Weather_____ Time _____
 Peak Stage _____ Current Stage _____ ID # _____
 Culvert size _____ Culvert Flow Depth _____ Culvert invert _____
 High velocity width _____ Low velocity width _____ RISING
 Dist #1 _____ Time #1_ Dist #1 _____ Time #1_____ OR
 Dist #2 _____ Time #2_ Dist #2 _____ Time #2_____ FALLING
 Dist #3 _____ Time #3_ Dist #3 _____ Time #3_____ STAGE?
 Sketch map of high and low velocity strands: Sketch cross-section of channel: R F

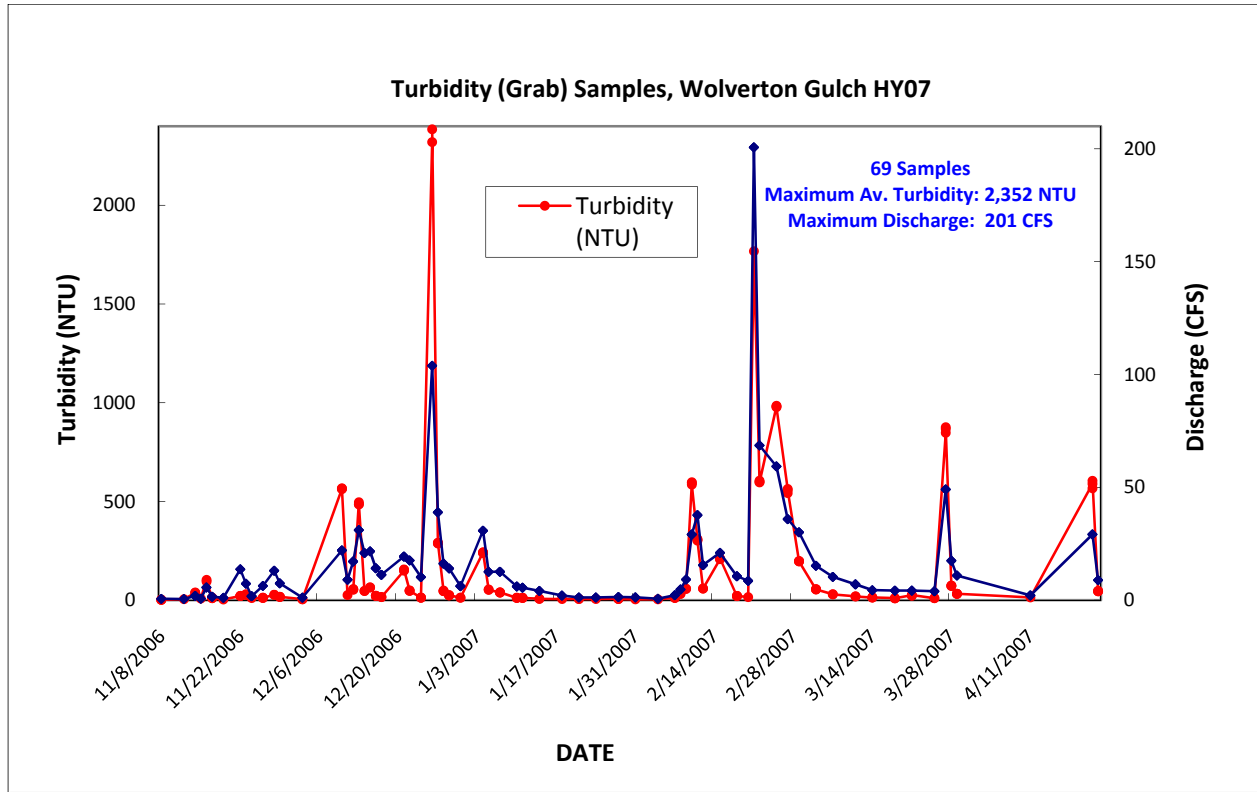
TUM # _____
 Turbidity _____ NTUs
 Measured by_
 Date/Time_

Comments:

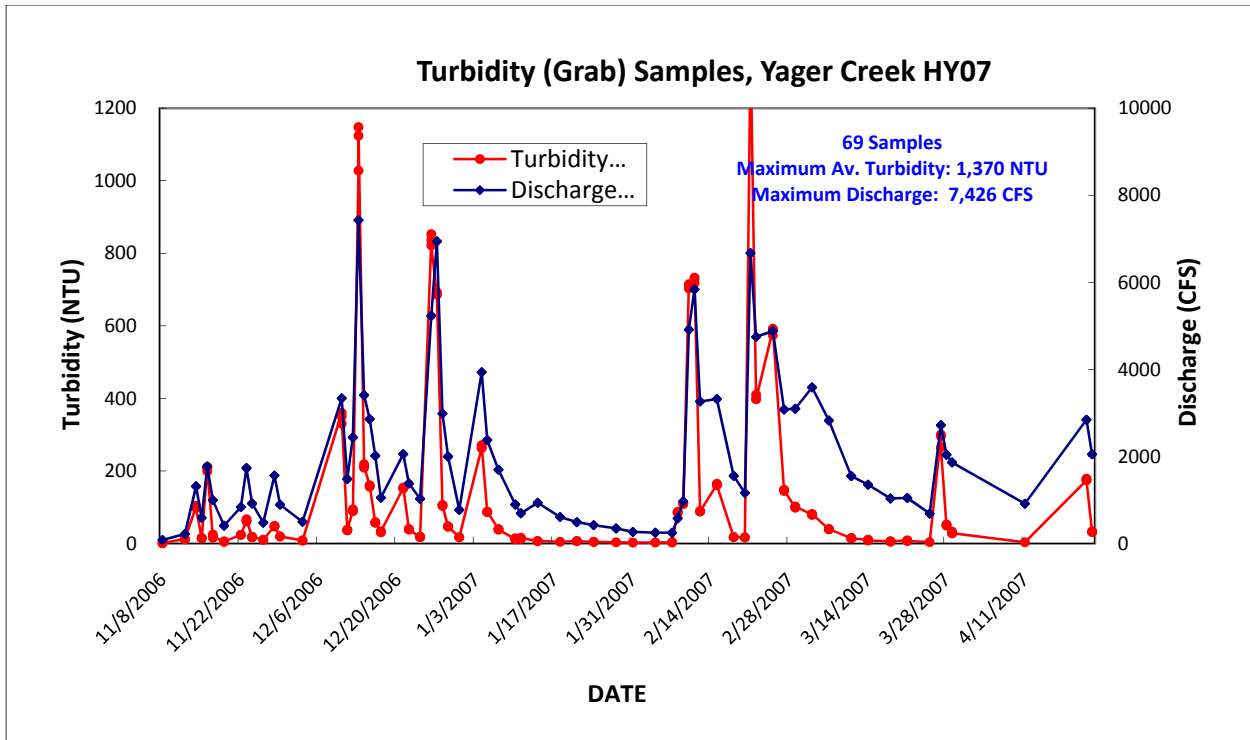
APPENDIX E: Water Quality Grab Sample Data Entry Sheet.

HY	VDWP Sample Sign-in Log Cuddeback School Lab																							
2006																		PAGE						
Copied																								
		<i>By = Name or TTS or Time ISCO NTU < 1000, Code = 0 NTU > 1000, Code = 1</i>							<i>Type: ISCO, HACH, DI, 2x6, 2x6P, 3x7 etc</i>															
BROUGHT TO LAB		SAMPLE							TURBIDITY							STAGE			VEL.			REMARKS		Data
BY	DATE	ID No.	LOCATION	DATE	TIME	BY	Dump	Bott #	S/N	NTU	CODE	TYPE	DATE	TIME	BY	Ft.	Sec.	Dist.			Entry			
JN	3/6/2000	04IS 0673	FTR	2/18/2000	14:50	TTS	1	3	9614	180	0	ISCO	2/19/2000	22:15	CF	1.5	5.50	10.0'	01 FTR 03 Shed Plate					
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										
	/ /			/ /	:								/ /	:										

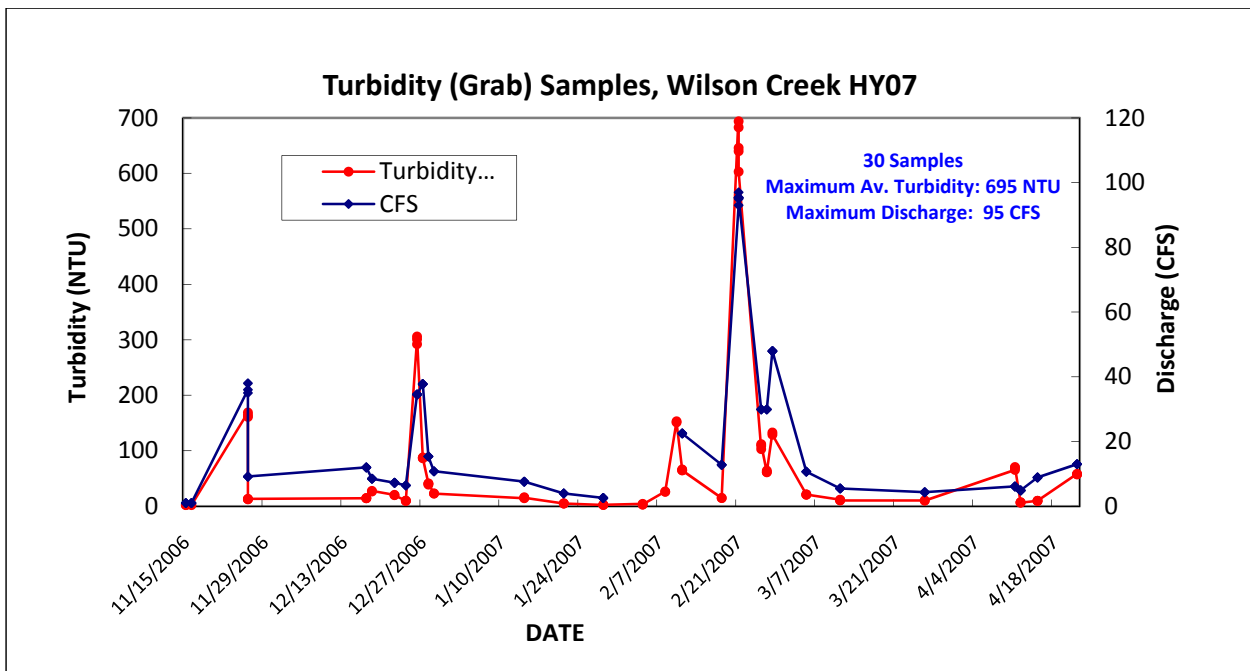
APPENDIX F: Turbidity-Discharge fluctuations over time in streams sampled within the Lower VDR Basin during HY07.



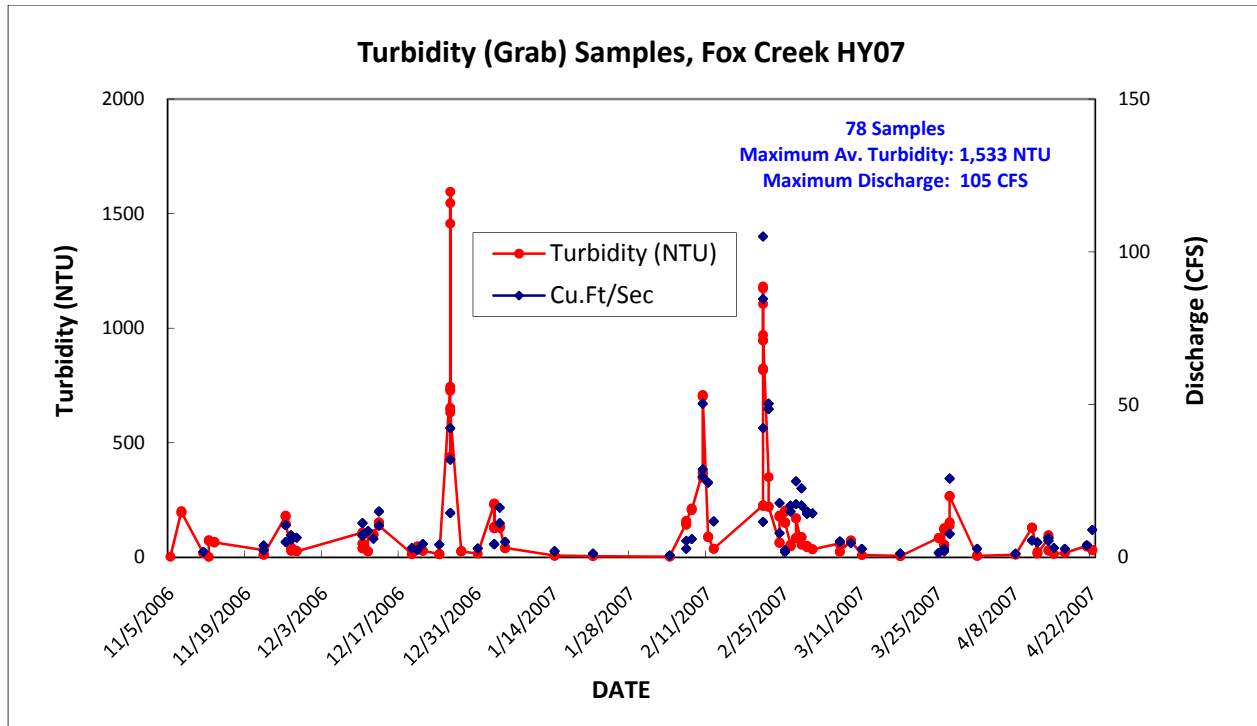
Turbidity and discharge at Wolverton Gulch, HY07.



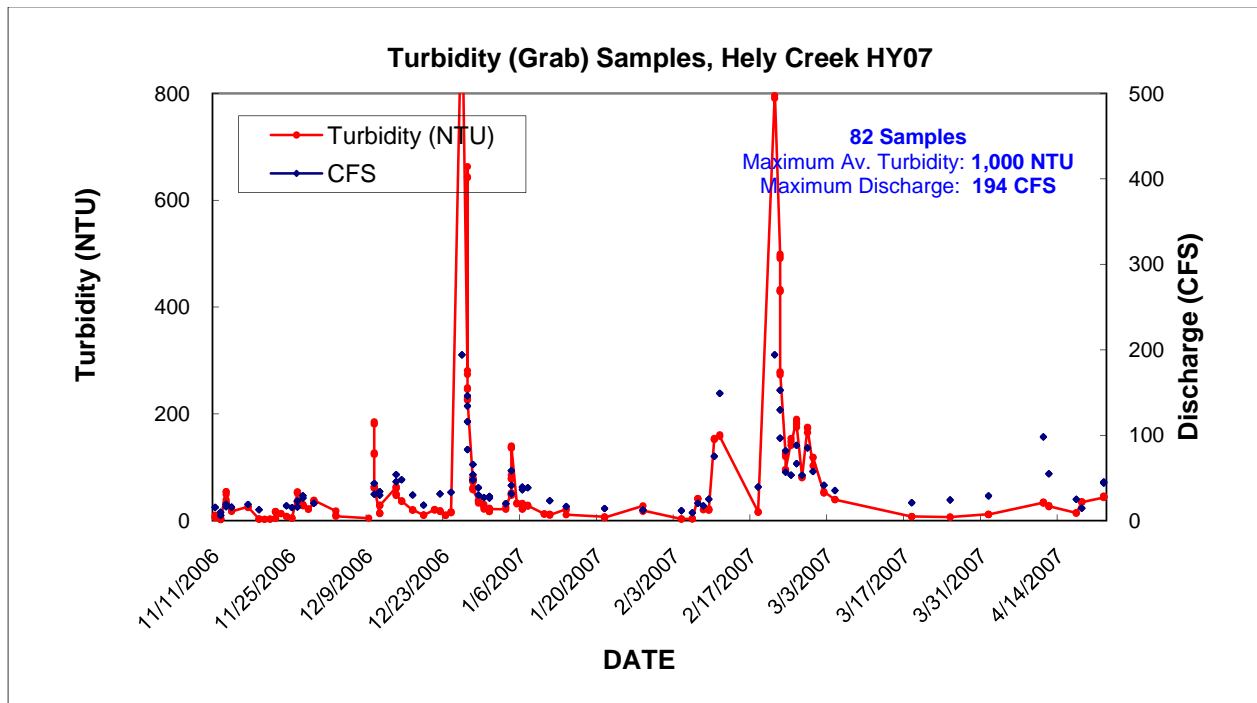
Turbidity and discharge at Yager Creek, HY07.



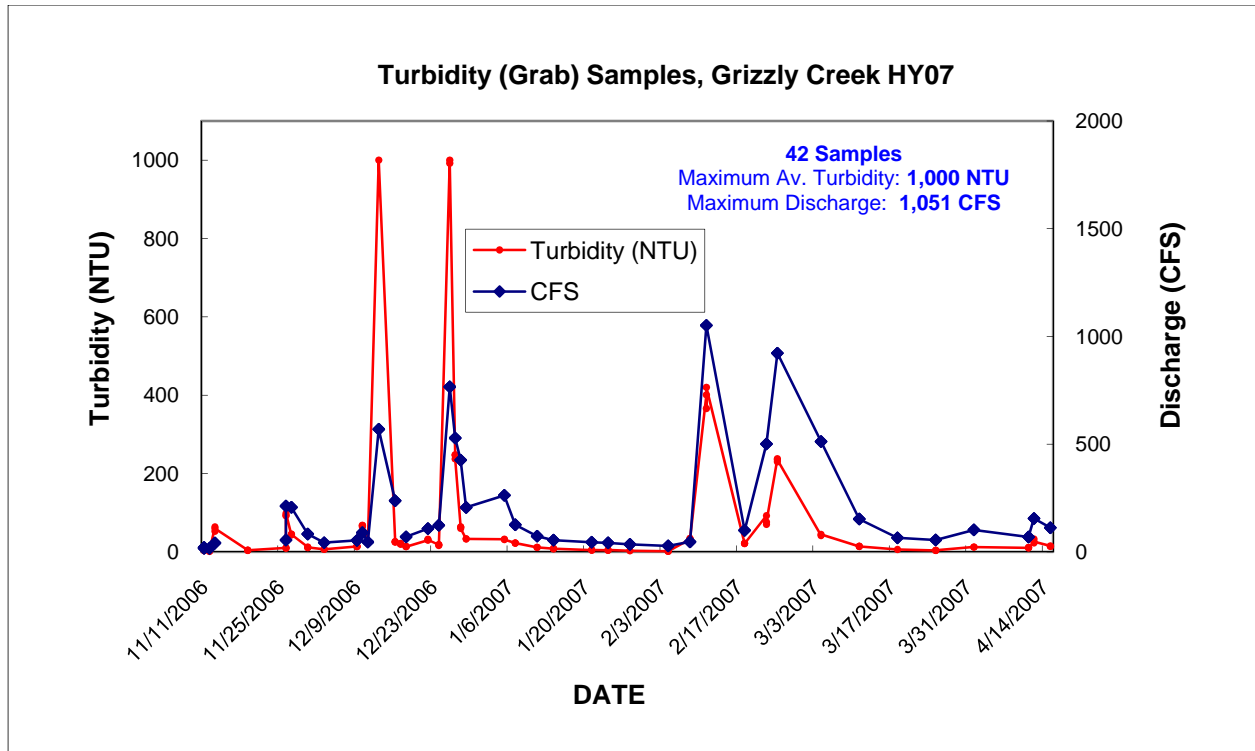
Turbidity and discharge at Wilson Creek, HY07.



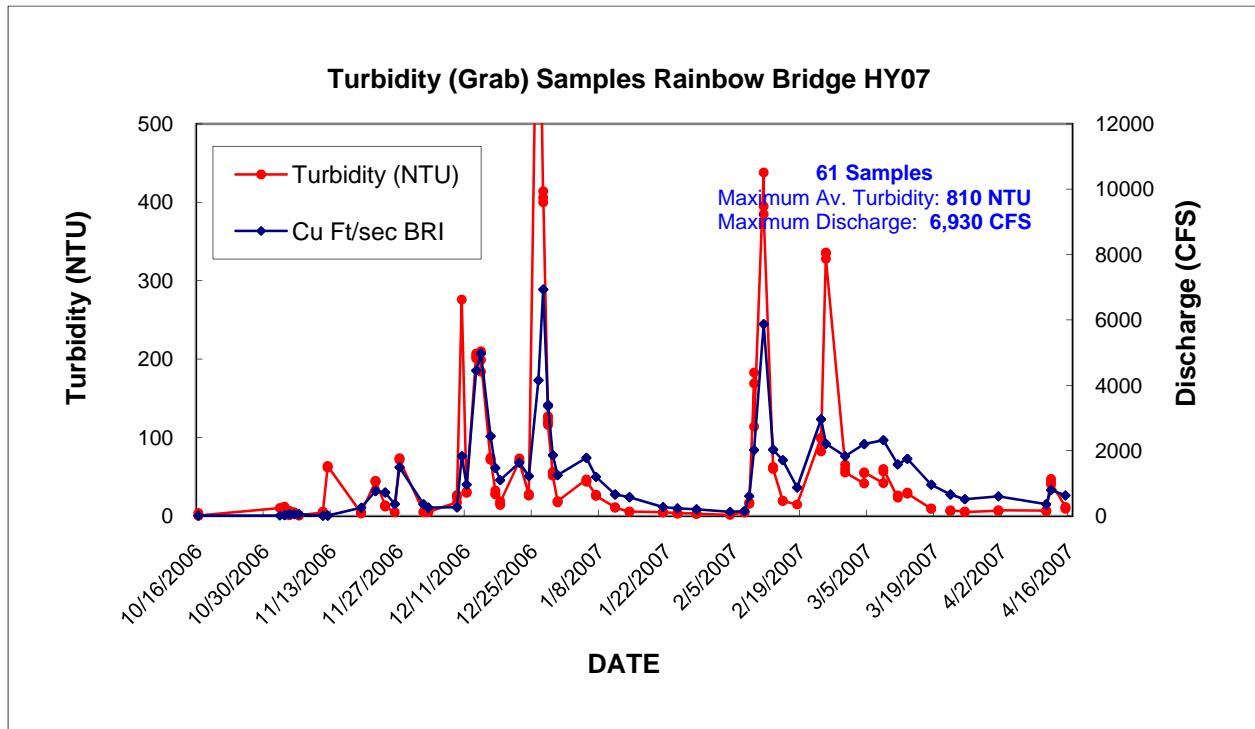
Turbidity and discharge at Fox Creek, HY07.



Turbidity and discharge at Hely Creek, HY07.

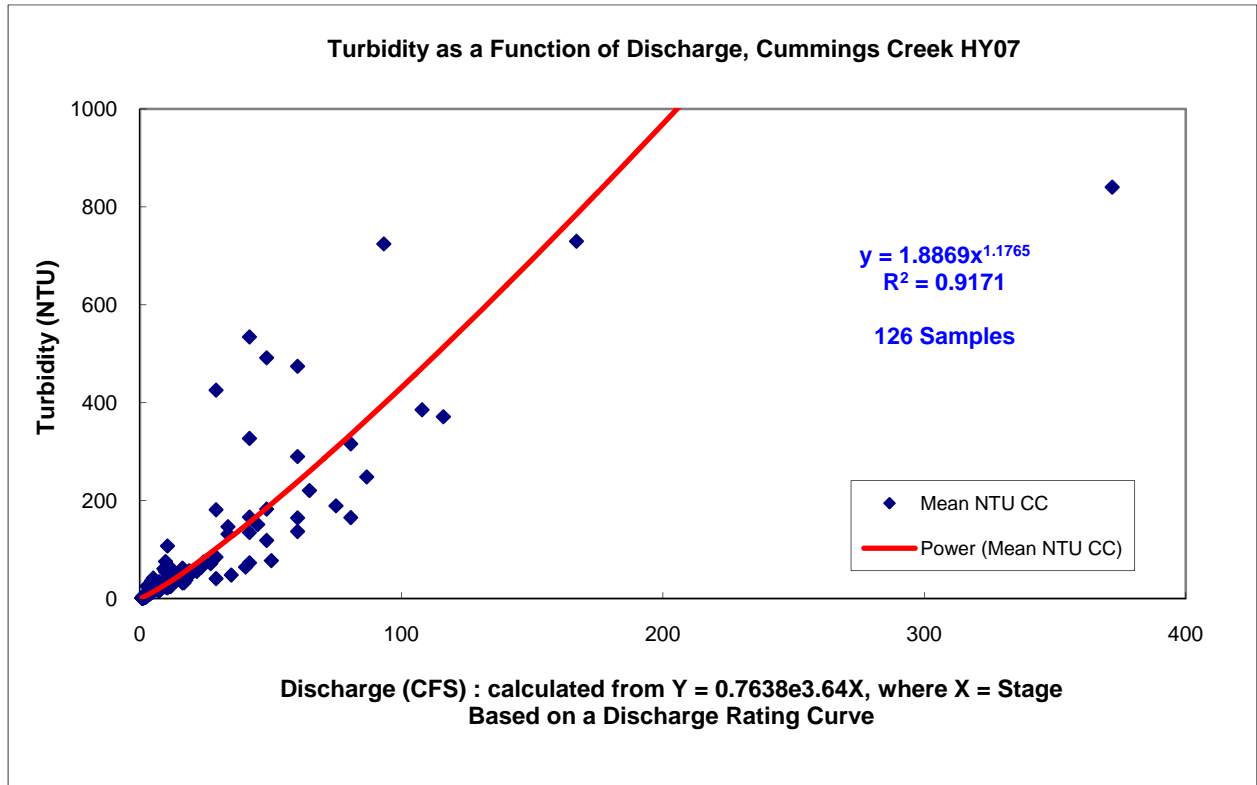


Turbidity and discharge at Grizzly Creek, HY07.

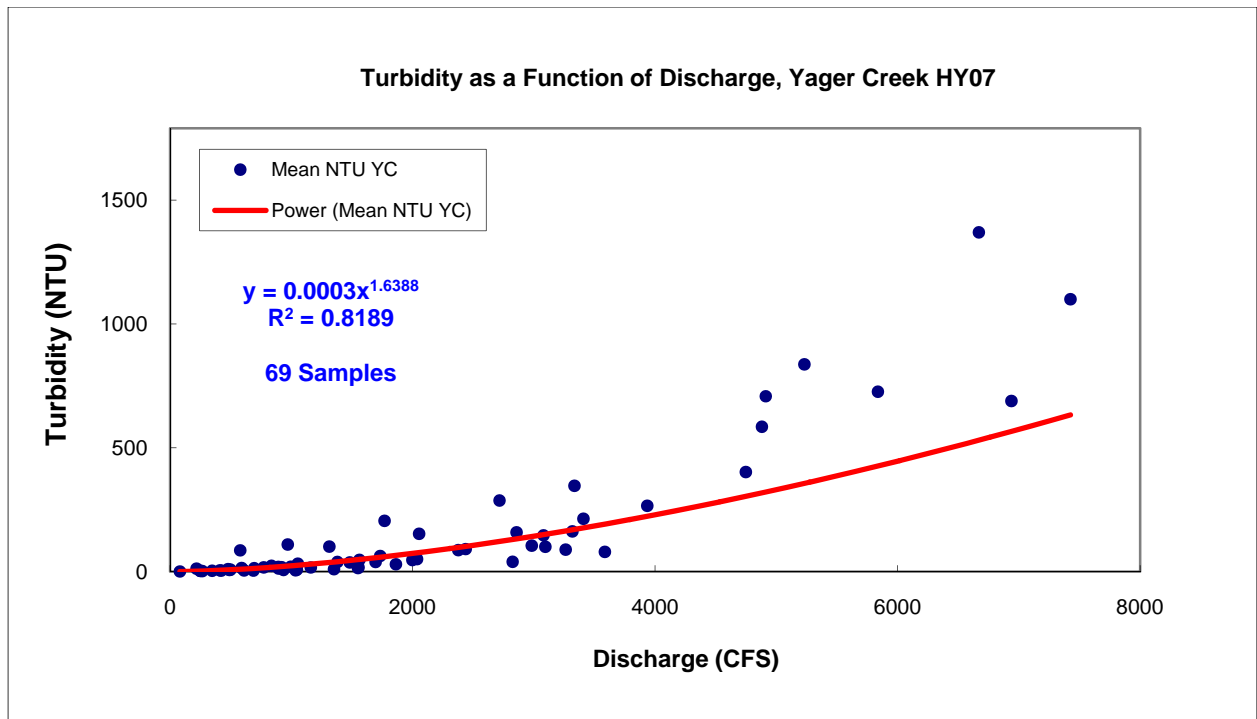


Turbidity and discharge at Main Stem Rainbow Bridge, HY07.

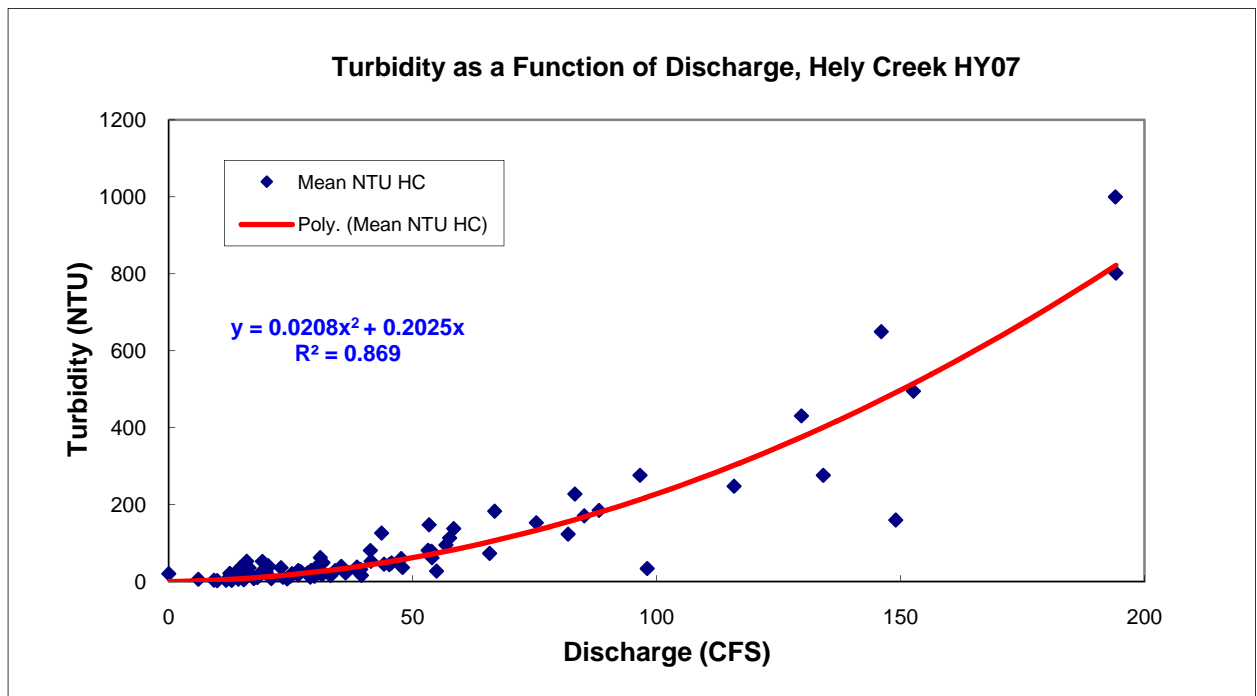
APPENDIX G: Turbidity-Discharge functions derived for streams sampled within the Lower VDR Basin in HY07.



Grab sample turbidity-discharge function for Cummings Creek in HY07.

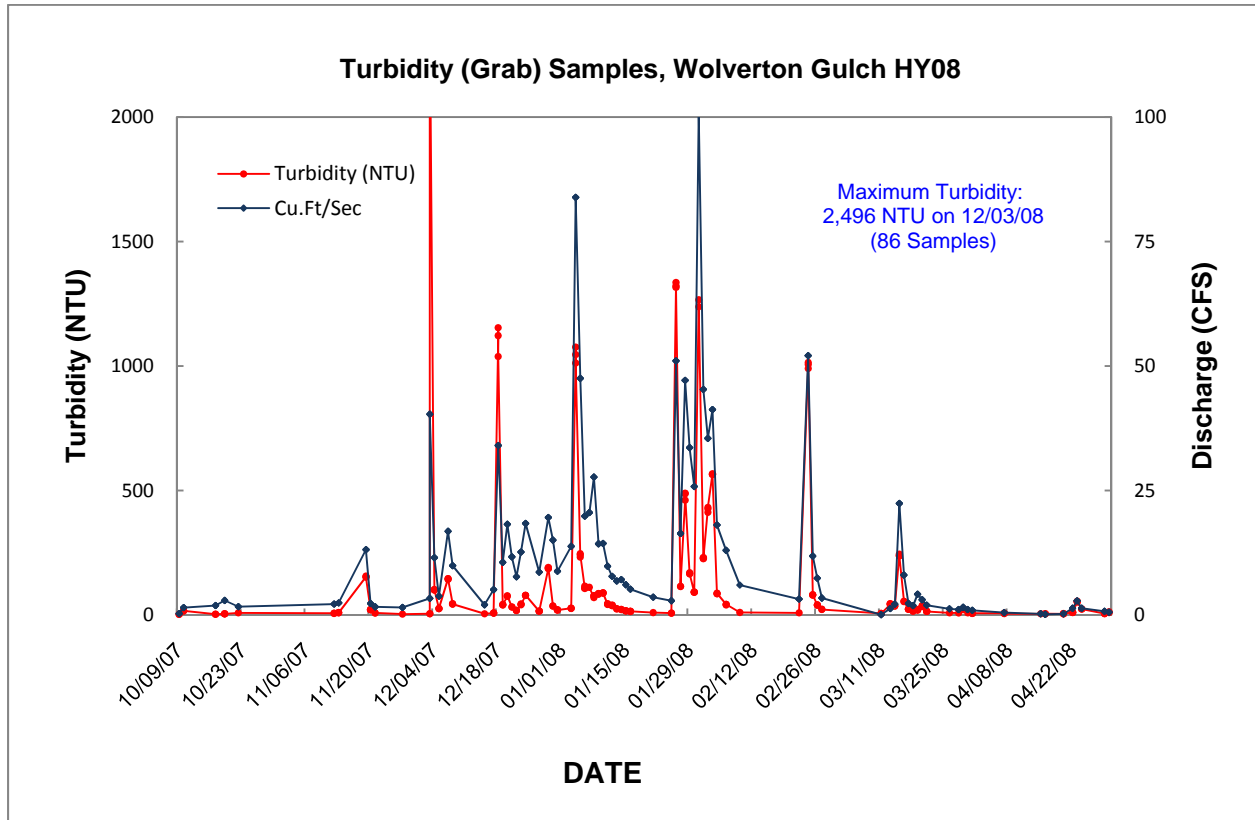


Grab sample turbidity-discharge function for Yager Creek in HY07.

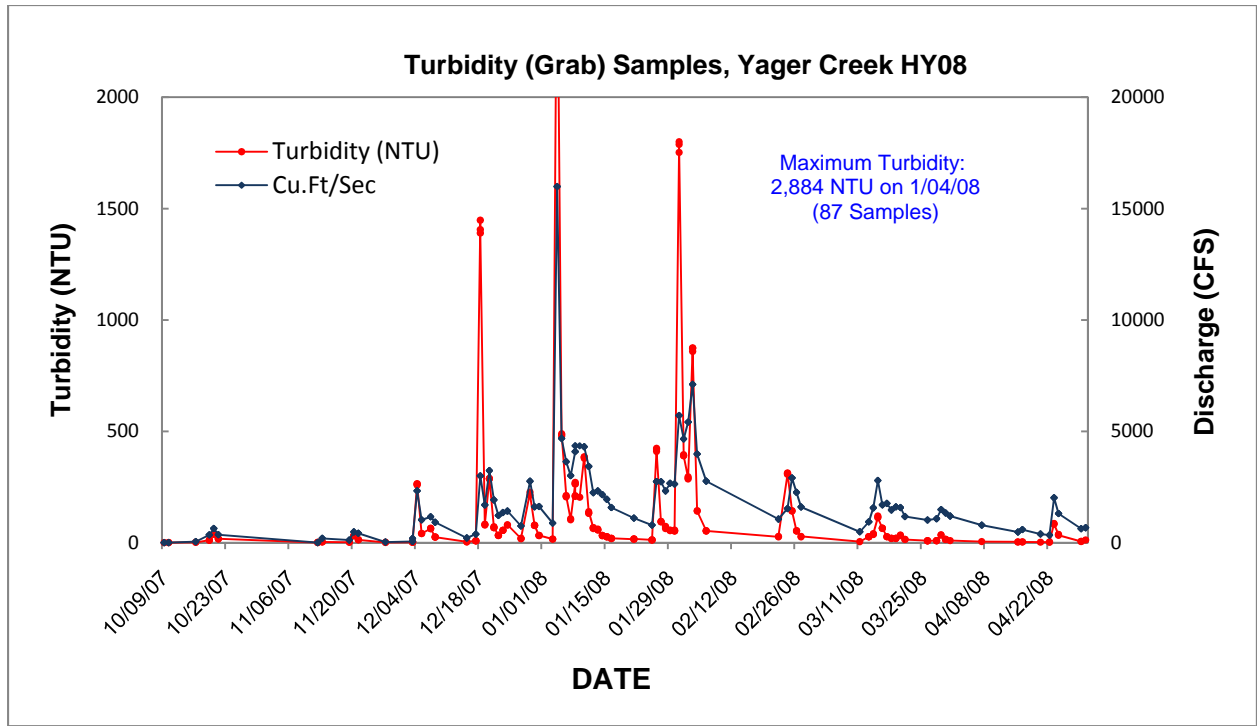


Grab sample turbidity-discharge function for Hely Creek in HY07.

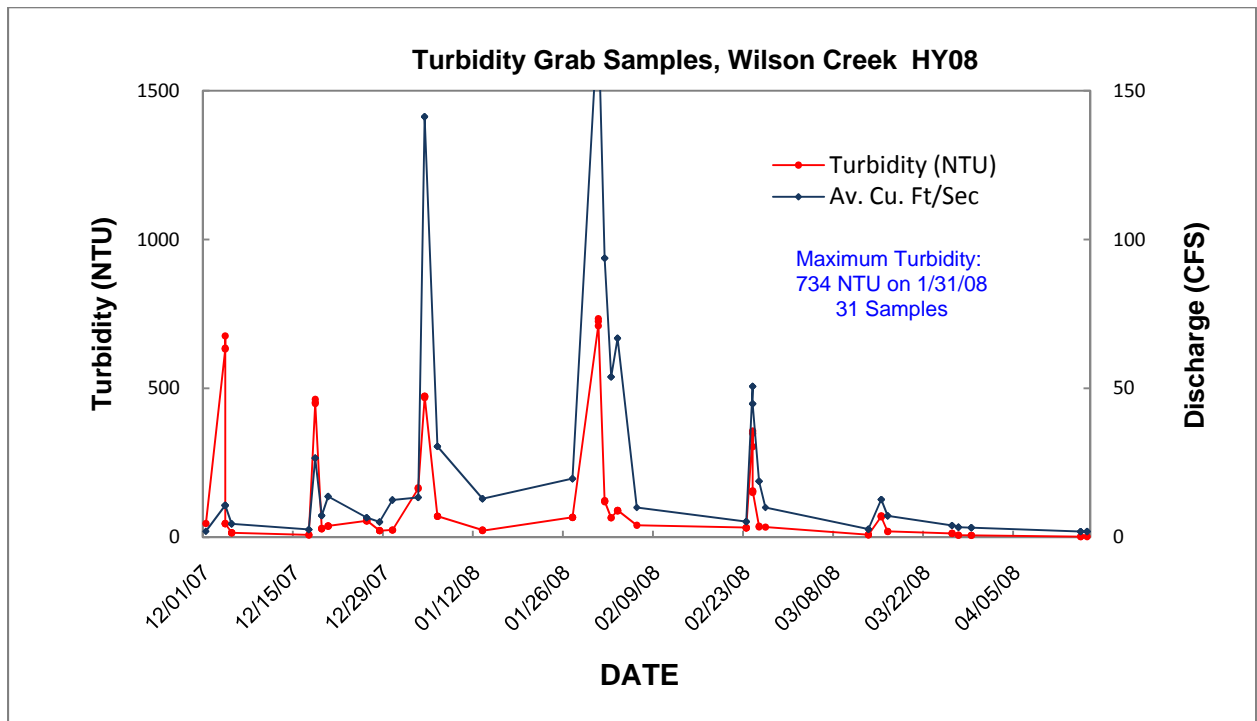
APPENDIX H: Turbidity-Discharge fluctuations over time in streams sampled within the Lower VDR Basin during HY08.



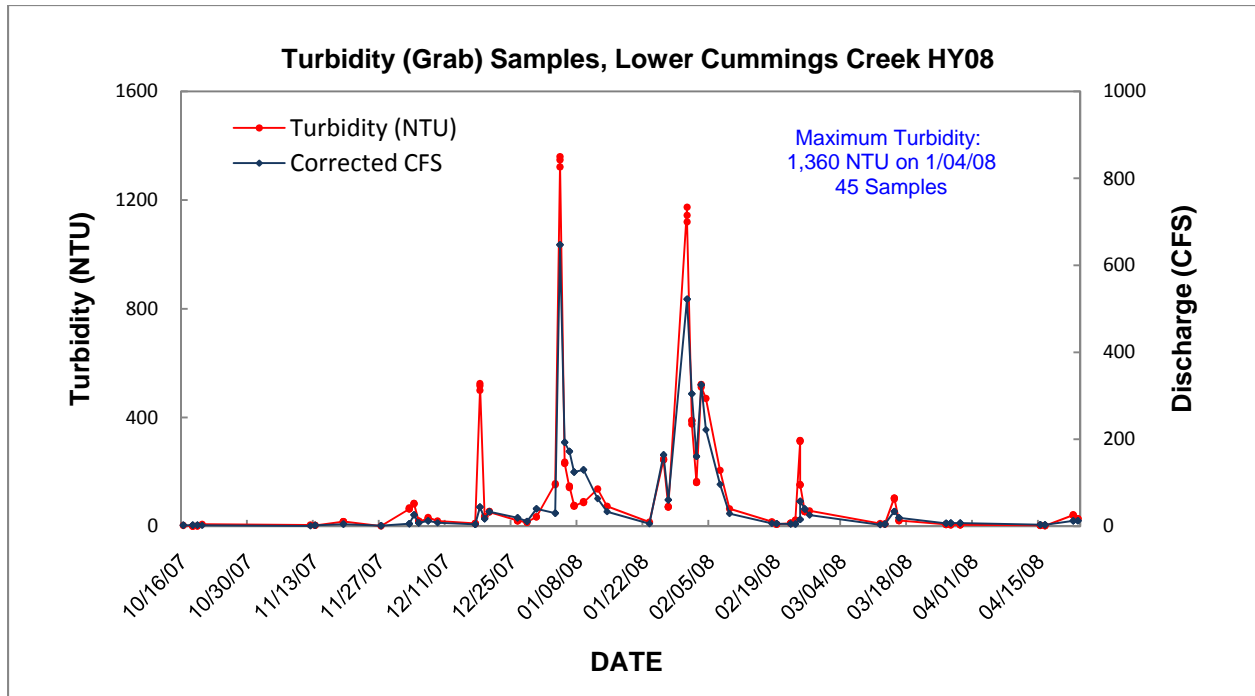
Turbidity and discharge at Wolverton Gulch, HY08.



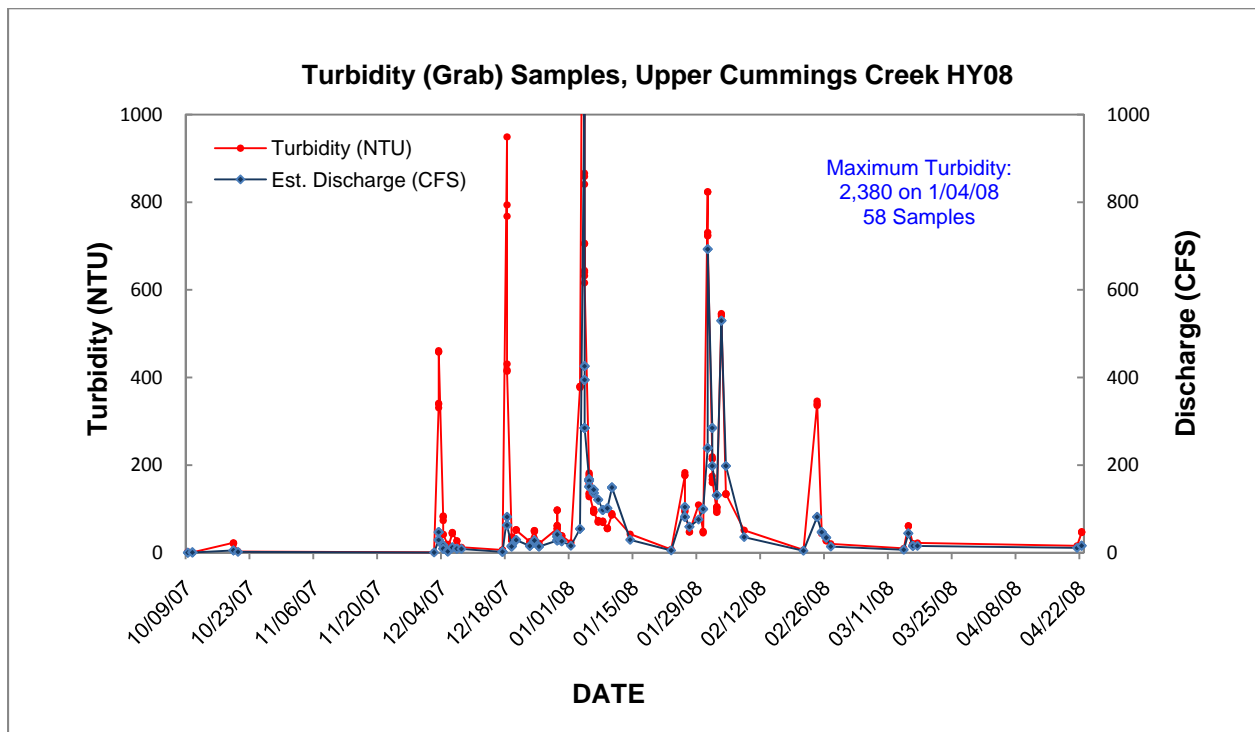
Turbidity and discharge at Wilson Creek, HY08.



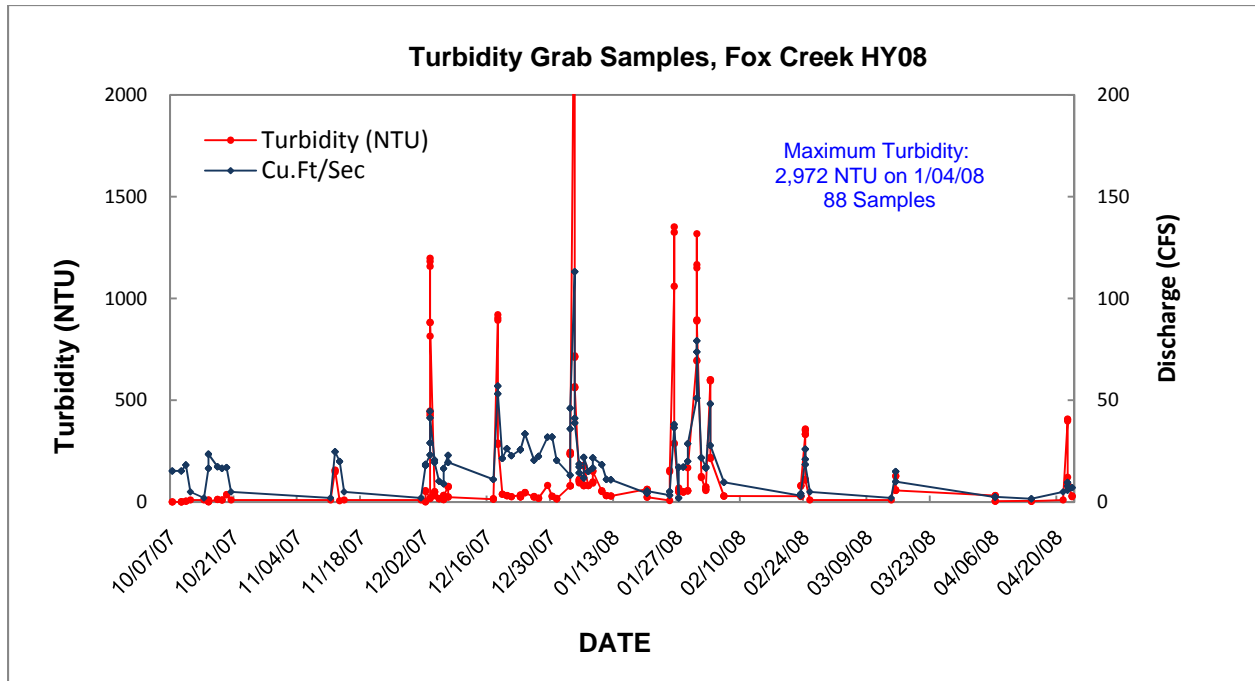
Turbidity and discharge at Wilson Creek, HY08.



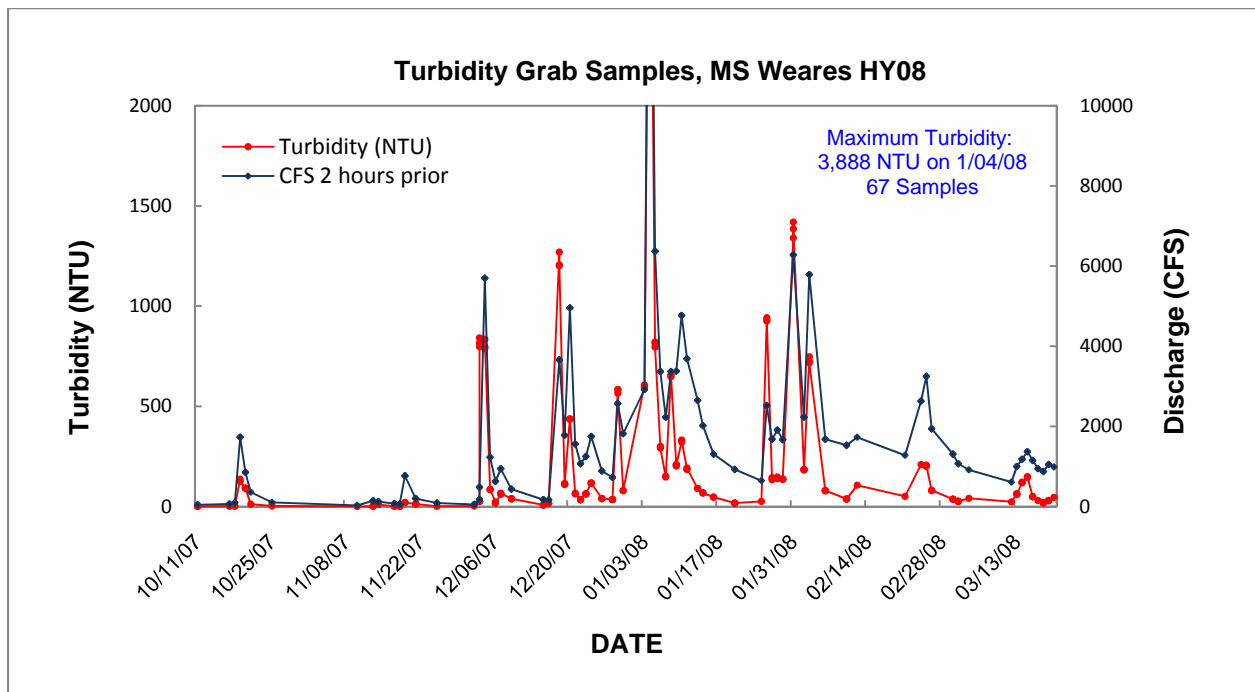
Turbidity and discharge at Lower Cummings Creek, HY08



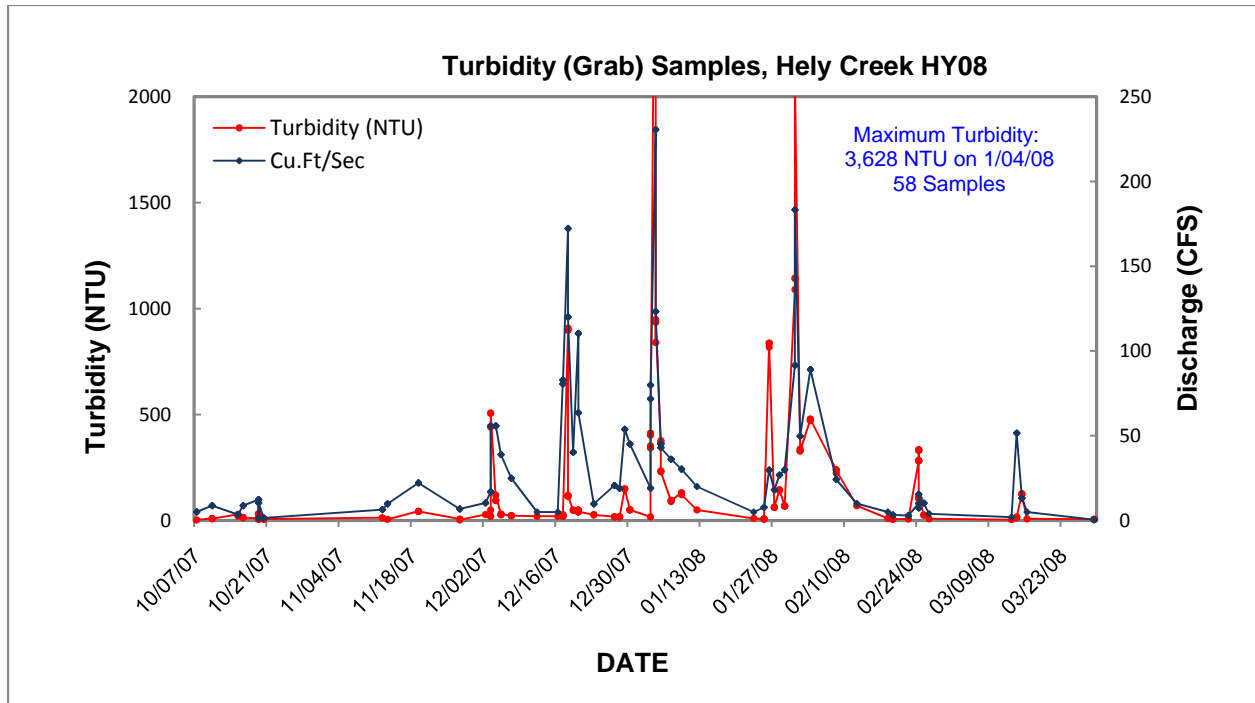
Turbidity and discharge at Upper Cummings Creek, HY08.



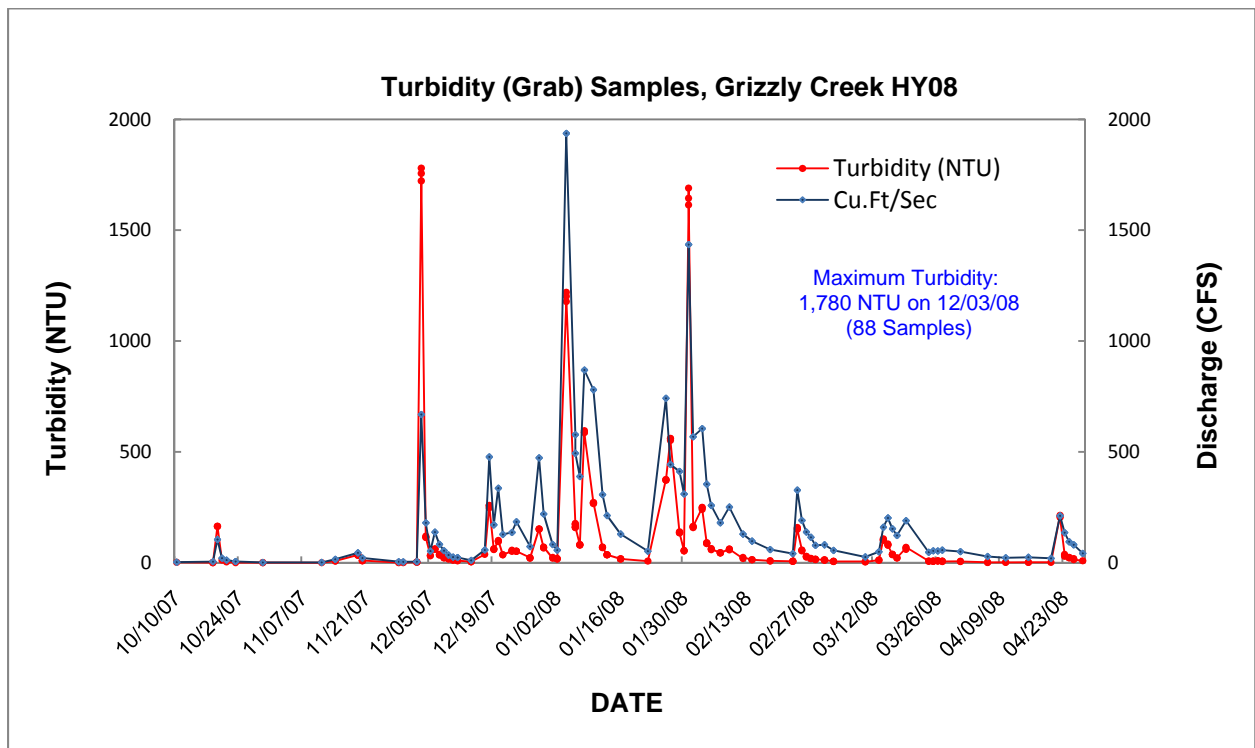
Turbidity and discharge at Fox Creek, HY08.



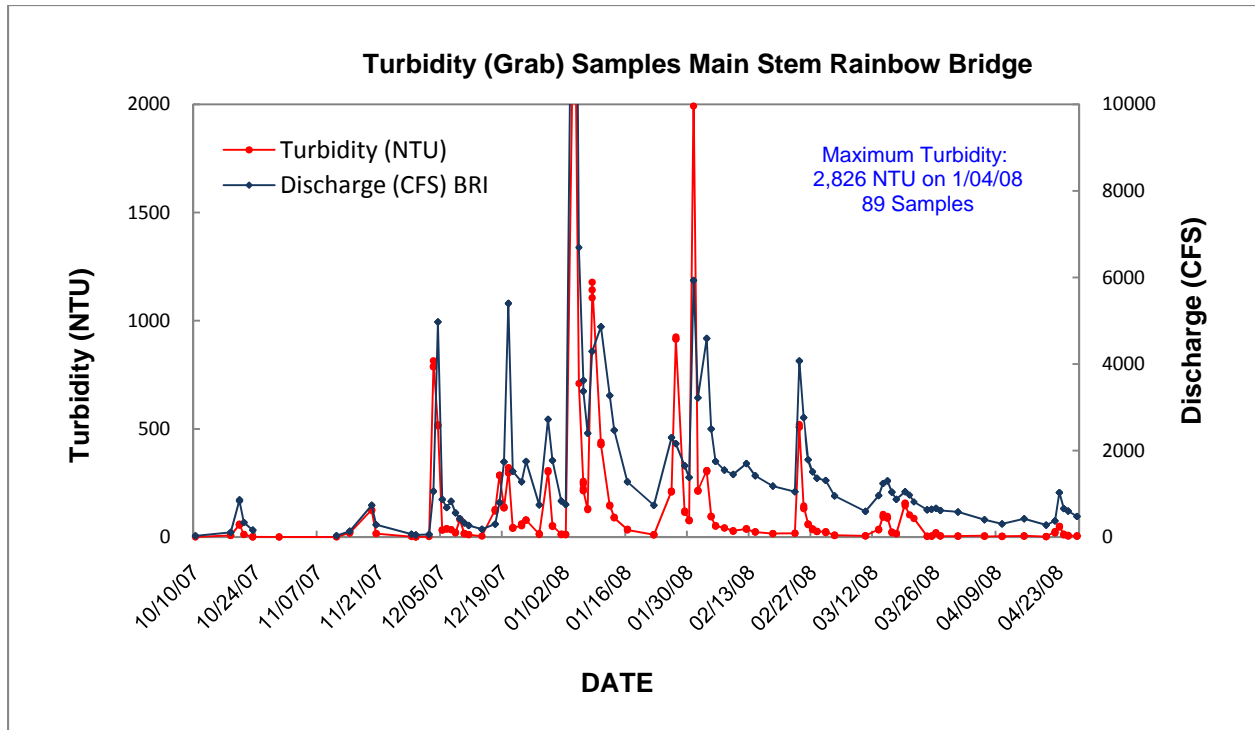
Turbidity and discharge at Main Stem Weares, HY08.



Turbidity and discharge at Hely Creek, HY08.



Turbidity and discharge at Grizzly Creek, HY08.



Turbidity and discharge at Rainbow Bridge, HY08.

APPENDIX I: List of Deliverables.

WORK PERFORMED BY GRANTEE

1. Technical Advisory Committee (TAC)

The Grantee's website (www.fovd.org) will post an updated section devoted to the watershed Project. This section will explain the purpose, goals, objectives, and anticipated outcomes, as well as posting commentary on its status with reports summarizing the work, and observed trends.

1.1 Recruit TAC participants through in person contact, phone calls, e-mail, and Grantee's website describing objectives and goals.

1.2 Select TAC members comprising of local scientists and experts, interested citizens and landowners, and representatives from state agencies, including the California Department of Fish and Game (CDFG).

1.3 Conduct quarterly meetings to review Project progress (including oversight of the turbidity and sediment sampling, macro invertebrate sampling, current status of training sessions, , GIS database and map production, and timeliness of website development).

1.4 Provide sign-in sheets and meeting minutes, as well as overall summations and status reports on Project activities and accomplishments.

1.5 Update website weekly to include:

- a) Access to telephone numbers of Project participants, including the Project Director and staff.
- b) A calendar/bulletin board interface on the website in which a complete schedule of all events and sampling dates will be listed. Users will be able to access the bulletin board and quickly view specific dates for activities.
- c) An interactive web page where members of the workgroup and community can post questions concerning the Project, and view other pertinent information. Timely responses to these questions by staff and stakeholders will be posted weekly.

2. Stakeholder Participation and Database Development

By recognizing critical planning watersheds and potentially impaired streams, estimating the best locations for monitoring sites for the study, and determining how to best address community interest, the Grantee will identify stakeholders with vested interests in the Project. Stakeholders will typically consist of non-profit organizations, government agencies, state and county parks, elementary school districts, local landowners, and

members of the community at large. Unless otherwise requested, stakeholders and contact information will be listed on Grantee website.

2.1 Categorize Project stakeholders on website, as to types (e.g. landowner, scientist, etc.), specific interests, and supplemental information such as type of involvement, issues of significance, and recommendations, and store in an inventory database to be updated regularly.

2.2 Update GIS maps detailing specific issues such as impaired streams, upslope conditions of concern, and pertinent analyses, such as road densities and road-stream crossings. A hard copy will be provided that will cover the progress of the Project, data collected, and training sessions..

2.3 TAC/stakeholders will make recommendations at bi-annual meetings. Meetings will be announced via e-mail and website one (1) week prior to gathering.

2.4 Conduct an annual workshop and/or conference to inform stakeholders and landowners of the accomplishments of the Project and provide an opportunity for stakeholders to express opinions on its value and direction.

2.4.1 First annual workshop/conference will consist of presentations (e.g., Power Point) by various staff members outlining the accomplishments of the previous year, including charts, graphs, photos, and maps of the basin and planning watersheds of particular interest.

2.4.2 Second annual workshop/conference will involve updates and additions to the presentations in the first workshop, and allow the Project Director and staff members to introduce the Watershed Plan.

3. Watershed Resource Inventory

All information obtained through literature review will be catalogued in a collective Project bibliography. All data will be inventoried in appropriate database that will include one for raw data and statistical analyses, and one for spatial data and GIS analyses.

Identify reference studies and data that have been conducted in regard to the Van Duzen River Basin, and search all available data pertaining to water quality, salmonid reproduction and survival, and upslope (land use) conditions. Gaps in available data will be noted accordingly.

Update all available spatial (GIS) data in an ArcView project, including current hydrologic and geographic information, climate history, stream flow, existing aquifers, wells and pumping history (if available), geology, soils, erosion processes, channel networks, area, elevation, and topography, additional large scale stream and road networks (including digitizing of logging roads from digital ortho quarter quads (DOQs) and road reconnaissance), vegetation, land use,

change scene detection, timber harvest history, digital ortho quarter quads (DOQs), topo maps, etc., on a continual basis.

3.3 Grantee will walk paved and unpaved road reaches of the Project area (with the Van Duzen Firesafe Council), to recommend and assess road and culvert conditions within the critical planning watersheds, assess fuel conditions, and identify hazardous fuel reduction and fire control needs.

3.4 Download road data to GIS database and incorporate for later analysis.

3.5 Develop framework for a Watershed Resource Inventory that catalogues the watershed information collected in Items 3.1-3.4. The Inventory will contain a list of existing data, projects, contacts, and other information designed to assist stakeholders in accessing watershed information. The inventory will be posted on website.

4. Public Awareness and Technology Transfer

4.1 Conduct bi-annual public meetings in conjunction with TAC/stakeholder meetings in Item 2.3.

4.2 Publish at least one (1) article per year in the Eel River Reporter and at least one (1) article in a minimum of one (1) newspaper describing current efforts and accomplishments.

4.3 Distribute fliers and posters of upcoming events within the community and place information packets and copies of the Eel River Reporter in local stores.

4.4 Post photos of watershed conditions and salmon migration on website.

4.5 Organize and conduct a training certificate program for volunteers to learn water quality sampling techniques, the use of GPS, data recording techniques, and the use of field equipment.

4.6 Promote public awareness by conducting workshops on salmon migration, engaging in stream field studies on macro invertebrates, and the role of gravel in fish habitat.

4.7 Create a video record of training sessions, field excursions, and community involvement.

5. Watershed Analysis

Data will be collected on an on-going basis throughout the year. Monitoring for turbidity and suspended sediment, and other water quality indicators will be at peak activity throughout the hydrologic year that represents the rainy season. Other activities such as

habitat typing, sampling for macro invertebrates, and collection of observational data will be more frequent during the spring, summer, and fall months.

5.1 Establish ten (10) monitoring sites on the main stem and tributaries, using standard Calwater Planning Watersheds as location references.

5.2 Collect water quality samples, specifically turbidity, sediment, and stream flow at approximately ten (10) sites.

5.2.1 Sampling will consist of grab samples taken by volunteers during and subsequent to all storm events.

5.2.2 Water monitoring will also be conducted using at least two (2) continuous types of turbidity and suspended sediment recording stations.

5.3 Collect and record water quality (temperature and turbidity), macro invertebrates, information on salmon habitat (including gravel), and observed physical conditions of the stream at five (5) monitoring sites. Corroborative data such as pH, dissolved oxygen, conductivity, and flow rate, and suspended sediment will be collected at these sites.

5.4 Float and/or walk parts of the mainstem and three (3) tributaries during early spring and fall. Use GPS to record stream habitat type and observed changes. Observations will be made in accordance with CDFG protocols. Data will be entered into the GIS database.

5.4 Engage in GIS analysis of conditions such as road density, stream crossing density, vegetation, geology, and cumulative impact, to develop an assessment of relative watershed health.

6. Watershed Management Goals and Strategies.

Bi-annual workgroup meetings involving staff, stakeholders, and landowners will address the short- term and long- term vision, goals, and strategies of the watershed Project.

6.1 Define the long-term vision for the basin.

6.2 Define short-term and long-term goals, and how these goals relate to current and potentially future conditions within the basin.

6.3 Develop planning strategies for future watershed activities, including land use planning strategies for watershed protection, integration of watershed planning with existing planning, regulatory and non-regulatory activities, and development of partnerships.

6.4 Develop regulatory strategies that could benefit the watershed such as ordinances, permits, land conservation practices, site design, and best management practices.

6.5 Identify preservation/restoration projects that could benefit the watershed, such as flood control, water treatment, riparian enhancement, and watershed stewardship programs.

6.5 Identify research and monitoring opportunities that can fill data gaps, address issues of concern, and provide solutions to watershed problems.

6.7 Develop educational strategies that could be used by municipalities, schools, environmental groups, landowners, and other members of the local community.

6.8 Develop a strategy to ensure that the Watershed Management Plan becomes and remains a viable part of future decision-making processes that relate to the Van Duzen River Basin.

6.9 Produce a Watershed Management Goals and Strategies Report containing the products of Items 6.1 through 6.8.

7. Watershed Management Plan (WMP)

Elements of the Watershed Analysis Report and the Watershed Management Goals and Strategies Report will be incorporated into the Van Duzen Local Area Plan.

7.1 Develop a WMP to include:

- a) Project vision
- b) Project goals
- c) Project stakeholders
- d) Geographical and jurisdictional boundaries of the Project
- e) Current conditions of the basin
- f) Incorporate Fire Safe Council strategies
- g) Prioritized proposed actions and implementation strategies necessary to achieve goals
- h) Persons, organizations, and public agencies responsible for implementing the proposed actions
- i) Schedule for implementing proposed actions, and potential funding sources

Submit draft WMP.

Submit final WMP.

TABLE OF DELIVERABLES

Item	DESCRIPTION	CRITICAL DUE DATE	ESTIMATED DUE DATE
EXHIBIT A – SCOPE OF WORK			
A.	PLANS AND COMPLIANCE REQUIREMENTS		
1.	GPS information for Project site and monitoring locations	Day 90	
2.	Project Assessment Evaluation Plan (PAEP)	Day 30	
	Non Point Source Pollution Reduction Project Follow-up Survey Form		Annually
3.	Monitoring Plan (MP)	Day 90	
	Monitoring Reports		Quarterly
4.	Quality Assurance Project Plan (QAPP)	Day 90	
5.	Copy of final CEQA/NEPA Documentation (if exempt, need a Notice of Exemption (NOE) filed		2/07
6.	Landowner Agreement(s)		11/06
7.	Applicable Permits		N/A
B.	WORK TO BE PERFORMED BY GRANTEE		-
1.	Technical Advisory Committee		-
1.1.	Copies of fliers, newspaper announcements, etc.		Quarterly beginning 1/07
1.2	TAC member list		Quarterly beginning 1/07
1.4	Sign-in sheets, meeting agenda and minutes		Quarterly beginning 1/07
1.5	Copy of updated web pages		Quarterly beginning 1/07
2.	Stakeholder Participation and Database Development		-
2.1	Stakeholder information and member list		Bi-annually beginning 1/07
2.2	GIS Maps		Bi-annually beginning 5/07
2.3	Meeting agenda and minutes		Bi-annually beginning 5/07
2.4.1	First annual workshop report		9/07
2.4.2	Second annual workshop report		9/08
3.	Watershed Resource Inventory		-
3.1	List of reference studies		4/10

3.2	Evidence of GIS database (digital copy of the ArcView project)		8/08 & 8/09
3.3	Report of recommendation/assessments with Van Duzen Firesafe Council		9/07 & 9/08
3.5	Watershed Resource Inventory		8/09
4.	Public Outreach and Technology Transfer		-
4.1	Agendas and minutes from meetings		Bi-annually beginning 5/07
4.2	Newspaper articles		Bi-annually
4.3	Fliers, and posters, and copy of information packet		Bi-annually
4.4	Post photos on website		Quarterly
4.5	Training program synopsis, list of volunteers, proficiency checklists		Annually 11/07 & 11/08
4.6	Agenda/outline for Salmon Watch workshop, results of field studies		Annually beginning 11/07
4.7	Copy of Video record of trainings and field excursions		Bi-annually
5.	Watershed Analysis		-
5.1	Map of monitoring sites		3/07
5.5	Watershed Analysis Report		8/08 & 8/09
6.	Watershed Management Goals and Strategies		-
6.9	Watershed Management Goals and Strategies Report		8/08 & 8/09
7.	Watershed Management Plan		-
7.2	Draft Watershed Management Plan		5/10
7.3	Final Watershed Management Plan		6/10
EXHIBIT B – INVOICING, BUDGET DETAIL, AND REPORTING PROVISIONS			
A.	INVOICING		Monthly
E.	REPORTS		
1.	Grant Summary Form		Day 90
2.	Progress Reports by the twentieth (20 th) of the month		Monthly
3.	Natural Resource Projects Inventory (NRPI) Project Survey Form	Before final invoice	
4.	Draft Project Report	7/1/10	
5.	Final Project Report	8/1/10	