



## DEPARTMENT OF FISH AND GAME

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ENVIRONMENTAL  
PROTECTION



98 OCT 28 PM 4:12

October 26, 1998

Mr. Bruce M. Rucker  
Senior Geologist/Project Manager  
Stellar Environmental Solutions  
2110 Sixth Street  
Berkeley, CA 94710

Dear Mr. Rucker:

Redwood Regional Park Service Yard Fuel Leak Site, Oakland, California

In response to your October 9, 1998 work plan, October 14, 1998 letter, and telephone conversation of the same date on the subject project, I offer the following comments and recommendations.

First, let me say that I was surprised to learn that the October 9<sup>th</sup> work plan wasn't a draft, but a plan which had already been implemented; and any suggestions for modification could only be accommodated if they involved data presentation or evaluation. As I mentioned during our phone conversation, the approach seemed to rehash the amount of contamination in the near surface groundwater leading to the creek, but missed the biological connection that would address the need, or justification for further remediation. My conclusions have not changed since re-reading the document.

I have no objection with the October 9<sup>th</sup> work plan, and concede that it may provide some relevant insight into the situation at the subject site, but cannot "accept" it as adequate to address all site-related issues. The risk to fish and aquatic life from a release of petroleum hydrocarbons, even at admittedly low concentrations, is difficult, if not impossible to assign, based solely on physical-chemical data, and assumed dilution. The toxicity data upon which most risk analysis are based are derived through chemical-specific methods, conducted under carefully controlled laboratory conditions without consideration of real world conditions (e.g. variations of insitu dissolved oxygen, temperature, or combinations of chemicals).

I have attached the requested copy of Fish and Game Code Section 5650(a)(1) which is an appropriate ARAR for cleanup unless other considerations are addressed; namely, that the prohibited petroleum product is infeasible to completely remove, and that the "placement" or release is not adversely affecting the instream biota. "Adversely affecting" means more than just the absence of acute or chronic toxicity, but also avoidance of reproductive effects on fish and invertebrates as well. This could be a tall order, but we have found that a well designed, seasonal, instream bioassessment program can provide vital evidence of whether-or-not local or far field effects are resulting from the discharge. I have attached a copy of the protocol and

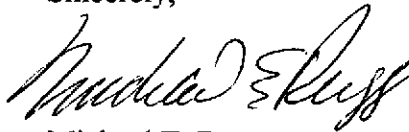
*Conserving California's Wildlife Since 1870*

Mr. Rucker  
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reference requested. If you have any questions on protocol or additional information on its applicability, please call Mr. Jim Harrington at the Department of Fish and Game, Water Pollution Control Laboratory at (916) 358-2858.

I look forward to working with you in the future on this project.

Sincerely,

A handwritten signature in cursive script, appearing to read "Michael E. Rugg".

Michael E. Rugg  
Water Quality Biologist  
Region 3

cc: Scott Seery, Ala Co. Health Care Services Agency  
Ken Burger, EBRPD  
Jim Harrington, WPCL

(2) A total allowable catch, reflecting the long-term yield each species is capable of sustaining, using the best available science and bearing in mind the ecological importance of the species and the variability of marine ecosystems.

(3) A permanent reduction in harvest.

(c) Funding to prepare the recovery and management plan and any planning and scoping meetings shall be derived from the fees collected for the abalone stamp.

(d) On or before January 1, 2008, and following the adoption of the recovery and management plan by the commission, the department may apply to the commission to reopen sport or commercial fishing in all or any portion of the waters described in Section 5521. If the commission makes a finding that the resource can support additional harvest activities and that these activities are consistent with the abalone recovery plan, all or a portion of the waters described in Section 5521 may be reopened and management measures prescribed and implemented, as appropriate. The commission may close or, where appropriate, may establish no-take marine refuges in any area opened pursuant to this section if it makes a finding that this action is necessary to comply with the abalone management plan.

(e) If the commission determines that commercial fishing is an appropriate management measure, priority for participation in the fishery shall be given to those persons who held a commercial abalone permit during the 1996-97 permit year.

*(Added by Statutes 1997 Chap. 787)*

## CHAPTER 2. POLLUTION

### Article 1. General

#### 5650. Pollute Waters; Hazardous Substances List

(a) Except as provided in subdivision (b), it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this state any of the following:

(1) Any petroleum, acid, coal or oil tar, lampblack, aniline, asphalt, bitumen, or residuary product of petroleum, or carbonaceous material or substance.

(2) Any refuse, liquid or solid, from any refinery, gas house, tannery, distillery, chemical works, mill, or factory of any kind.

(3) Any sawdust, shavings, slabs, or edgings.

(4) Any factory refuse, lime, or slag.

(5) Any cocculus indicus.

(6) Any substance or material deleterious to fish, plant life, or bird life.

(b) This section does not apply to a discharge or a release that is expressly authorized pursuant to \*\*\*, and in compliance with, the terms and conditions of a waste discharge requirement pursuant to Section 13263 of the Water Code or a waiver issued pursuant to subdivision (a) of Section 13269 of the Water Code issued by the State Water Resources Control Board or a regional water quality control board after a public hearing, or that is expressly authorized pursuant to, and in compliance with, the terms conditions of a federal permit \*\*\* for which the State Water Resources Control Board or a regional water quality control board has, after a public hearing, issued a water quality certification pursuant to Section 13160 of the Water Code. This section does not confer additional authority on the State Water Resources Control Board, a regional water quality control board, or any other entity.

(c) It shall be an affirmative defense to a violation of this section if the defendant proves, by a preponderance of the evidence, all of the following:

(1) The defendant complied with all applicable state and federal laws and regulations requiring that the discharge or release be reported to a government agency.

(2) The substance or material did not enter the waters of the state or a storm drain that discharges into the waters of the state.

(3) The defendant took reasonable and appropriate measures to effectively mitigate the discharge or release in a timely manner.

(d) The affirmative defense \*\*\* in subdivision (c) \*\*\* does not apply and may not be raised in an action for civil penalties or injunctive relief pursuant to Section 5650.1.

(e) The affirmative defense in subdivision (c) does not apply and may not be raised by any defendant who has on two prior occasions in the preceding five years, in any combination within the same county in which the case is prosecuted, either pleaded nolo contendere, been convicted of a violation of this section, or suffered a judgment for a violation of this section or Section 5650.1. This subdivision shall apply only to cases filed on or after January 1, 1997.

(f) The affirmative defense in subdivision (c) does not apply and may not be raised by the defendant in any case in which a district attorney, city attorney, or Attorney General alleges, and the court finds, that the defendant acted willfully.

*(Amended Statutes 1997 Chap. 766)*

#### 5650.1. Water Pollution - Civil Penalties

(a) Every person who violates Section 5650 is subject to a civil penalty of not more than twenty-five thousand dollars (\$25,000) for each violation.

(b) The civil penalty imposed for each separate violation pursuant to this section is separate, and in addition to, any other civil penalty imposed for a separate violation pursuant to this section or any other provision of law.

(c) In determining the amount of any civil penalty imposed pursuant to this section, the court shall take into consideration all relevant circumstances, including, but not limited to, the nature, circumstance, extent, and gravity of the violation. In making this determination, the court shall consider the degree of toxicity and volume of the discharge, the extent of harm caused by the violation, whether the effects of the violation may be reversed or mitigated, and with respect to the defendant, the ability to pay, the effect of any civil penalty on the ability to continue in business, any voluntary cleanup efforts undertaken, any prior history of violations, the gravity of the behavior, the economic benefit, if any, resulting from the violation, and any other matters the court determines justice may require.

(d) Every civil action brought under this section shall be brought by the Attorney General upon complaint by the department, or by the district attorney or city attorney in the name of the people of the State of California, and any actions relating to the same violation may be joined or consolidated.

(e) In any civil action brought pursuant to this chapter in which a temporary restraining order, preliminary injunction, or permanent injunction is sought, it is not necessary to allege or prove at any stage of the proceeding that irreparable damage will occur if the temporary restraining order, preliminary injunction, or permanent injunction is not issued, or that the remedy at law is inadequate.

(f) After the party seeking the injunction has met its burden of proof, the court shall determine whether to issue a temporary restraining order, preliminary injunction, or permanent injunction without requiring the defendant to prove that it will suffer grave or irreparable harm. The court shall make the determination whether to issue a temporary restraining order, preliminary injunction, or permanent injunction by taking into consideration, among other things, the nature, circumstance, extent, and gravity of the violation, the quantity and characteristics of the substance or material involved, the extent of environmental harm caused by the violation, measures taken by the defendant to remedy the violation, the relative likelihood that the material or substance involved may pass into waters of the state, and the harm likely to be caused to the defendant.

(g) The court, to the maximum extent possible, shall tailor any temporary restraining order, preliminary injunction, or permanent injunction narrowly to address the violation in a

## CALIFORNIA STREAM BIOASSESSMENT PROCEDURE

### (HABITAT ASSESSMENT AND BIOLOGICAL SAMPLING)

The California Stream Bioassessment Procedure (CSBP) is a standardized protocol for assessing physical and biological conditions of wadable streams in California. There are two companion documents for this procedure: "California Stream Bioassessment Procedure (Macroinvertebrate Laboratory and Data Analyses)" and "California Stream Bioassessment Procedure (Field and Laboratory Quality Assurance/Control)". The CSBP is a regional adaptation of the national Rapid Bioassessment Protocols described in "Rapid Bioassessment Protocols for use in Streams and Rivers: Benthic Macroinvertebrates and Fish" (EPA 444/4-89-001).

This document describes procedures for habitat assessment and biological sampling of wadable streams using benthic macroinvertebrates. Developing aquatic bioassessment techniques for California is an iterative process; contact the California Department of Fish and Game's Water Pollution Control Laboratory (WPCL) at (916) 358-2858, e-mail: [jharr@sna.com](mailto:jharr@sna.com) or visit the California Aquatic Bioassessment Web Site (<http://www.dfg.ca.gov/cabw/cabwhome.html>) for the most current version of the CSBP.

### MONITORING STRATEGIES

The CSBP can be used to detect aquatic impacts from point and non-point source pollution and for biological assessment of ambient water quality. This field sampling procedure was designed for collecting benthic macroinvertebrates from individual riffles chosen as part of an appropriately designed monitoring program. ***The CSBP may not be appropriate for all aquatic monitoring programs - contact WPCL for advice on proper application of the CSBP.*** The following bioassessment strategies can be employed for:

**Point Sources of Pollution** - There will be discernable perturbations, impacting structures or discharges into the stream with point sources of pollution. The affected section of stream and an upstream unaffected section should be surveyed for riffles having relatively similar gradient, substrate and physical/habitat condition. Each riffle becomes a potential sampling site for benthic macroinvertebrates. At least one riffle in the unaffected section should be sampled as a control. One or more riffles should be sampled in the affected section depending on the amount of detail that is required on downstream recovery. At least three samples should be collected at each riffle depending on the necessary level of statistical accuracy required for the project.

**Non-point Sources of Pollution** - There will be no obvious perturbations or discharges into the stream with non-point sources of pollution. The stream or stream section of interest should be surveyed for similar riffles, and then at least three riffles should be

7. Using a pencil, write the following information on a piece of water-proof paper and place in the jar: sample identification number followed by -01, -02 (to identify each transect sampled from a riffled), watershed name, date and sampler's initials.

### **Habitat Assessment**

The habitat assessment portion of this procedure should be used if a more comprehensive physical assessment is not planned. Habitat assessments can be used without biological sampling, but whenever biological sampling occurs, there must be a habitat assessment conducted for every riffle sampled.

8. Conduct a rapid assessment of physical conditions for an entire stream reach using the habitat parameters (last two pages of the CSBW) as described while walking in an upstream direction from the bottom to the top of the stream reach. The score should reflect the average conditions for the entire stream reach. Record habitat parameter scores on the cover page of a separate CSBW and make comments on any habitat impairments not covered by the habitat parameters.

9. For biological sampling, habitat parameters 1 through 3 should be used to evaluate the average condition along the transects sampled for benthic macroinvertebrates. Habitat parameters 4 through 7 should be used to assess conditions for a larger area upstream of the riffle section. Habitat parameters 8 through 10 should be used to assess each bank immediately upstream of the riffle section. Record habitat parameter scores on the cover page of each CSBW used for biological sampling.

### **Sample Handling, Storage and Transfer**

10. At the end of the field day, record the following information on a COC for each (or group of) biological samples: program name; watershed name; field ID numbers; sampling dates; and name, address, telephone number and signature of one of the crew members collecting the sample.

11. Verification samples and COCs must remain in a locked sample depository until a decision has been made to send them to a bioassessment laboratory for processing.

12. When transporting to a bioassessment laboratory, each (or group of) sample must be accompanied by a COC. Upon delivery, a Bioassessment Laboratory Number will be assigned to each sample. Record this number on the COC and each individual CSBW along with the name and address of the bioassessment laboratory. When all verification samples listed on the COC are accounted for, then the individual delivering the samples will sign the "Released By" portion and the laboratory personnel will sign the "Received By" portion of the COC. The original COC will remain at the laboratory and a copy will be retained by the project supervisor.

## CALIFORNIA STREAM BIOASSESSMENT PROCEDURE FIELD WORKSHEET

WATERSHED: \_\_\_\_\_

DATE: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_

TIME: \_\_\_\_\_

---

**CREW MEMBERS:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WATER TEMP: \_\_\_\_\_

RIFFLE LENGTH: \_\_\_\_\_

TRANSECT 1: \_\_\_\_\_

TRANSECT 2: \_\_\_\_\_

TRANSECT 3: \_\_\_\_\_

**GPS COORDINATES**

LONG: \_\_\_\_\_

LAT: \_\_\_\_\_

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**HABITAT ASSESSMENT  
PARAMETERS**

1. INSTREAM COVER: \_\_\_\_\_

2. EPIFAUNAL SUBSTRATE: \_\_\_\_\_

3. EMBEDDEDNESS: \_\_\_\_\_

4. CHANNEL ALTERATION: \_\_\_\_\_

5. SEDIMENT DEPOSITION: \_\_\_\_\_

6. RIFFLE FREQUENCY: \_\_\_\_\_

7. CHANNEL FLOW: \_\_\_\_\_

8. BANK VEGETATION: L: \_\_\_\_\_ R: \_\_\_\_\_

9. BANK STABILITY: L: \_\_\_\_\_ R: \_\_\_\_\_

10. RIPARIAN ZONE: L: \_\_\_\_\_ R: \_\_\_\_\_

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**BIOASSESSMENT LABORATORY  
INFORMATION**

Bioassessment Laboratory Number: \_\_\_\_\_

Bioassessment Laboratory Name and Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CDFG - WPCL

2005 Nimbus Rd. Rancho Cordova, Ca. 95670

(916) 358-2858 FAX (916) 985-4301 e-mail: [jharr@sna.com](mailto:jharr@sna.com)

Bioassessment homepage - <http://www.dfg.ca.gov/cabw/cabwhome.html>

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48461	14952	72619	73689	52059	37066	60050	66192	67049	64739	58237	81323	12373	36181	64900	39614	61303	05084	97670	01961
76534	38149	69692	31346	52093	18422	20498	33901	10319	43197	24189	75554	38495	42649	02971	97584	38223	52443	25037	56849
70431	28641	38506	14752	23793	59660	78854	78815	23756	86814	55373	14272	42729	29659	84359	02654	08409	57303	88003	31919
59584	03370	42806	11393	71722	93804	09095	07854	55589	46020	86077	66100	10773	11393	03972	05092	07932	83063	06585	18454
42485	58554	16085	51555	27501	73683	35427	33143	4507	50063	86077	90904	14779	15114	50267	52217	08539	04345	52750	22815
17340	10412	67189	85171	29082	44785	83638	02583	96483	76553	13506	84170	08716	28894	20133	99489	87768	95582	96081	20774
59183	62687	97178	80354	23512	97219	65921	02035	59947	91503	13226	14111	16074	15436	68840	17064	96917	24404	47708	17861
91800	02801	39919	09327	82504	28777	59049	79532	54500	79472	01642	25456	49804	29277	99473	03912	90488	73325	80266	18082
12066	24817	11039	48940	69554	55925	48379	12866	51232	21580	23155	70939	31381	20388	34279	96585	14146	16117	36564	25060
69407	91751	53512	23748	65906	91385	84993	27915	48491	91068	98436	61100	45346	94684	30877	18677	99324	70761	39525	34023
80467	04873	54052	25955	48518	13815	37707	66687	15770	04890	96571	81679	50387	77316	18874	00763	99457	70858	79674	93618
78057	67835	28302	45048	54781	92725	28434	91228	24443	18544	70877	59632	22985	95166	61995	63423	65135	13807	56638	49107
05468	39387	78171	84115	60269	94680	58812	42931	71894	61534	40910	75631	56653	42858	85768	21254	01195	21507	60054	49107
27304	39246	91350	99451	61882	78688	30339	60222	74032	23740	67847	75631	56653	42858	85768	21254	01195	21507	60054	49107
41146	50269	67005	48442	33100	18742	81640	31909	27841		67847	75631	56653	42858	85768	21254	01195	21507	60054	49107
64793	37696	27965	30459	91011	51426	31006	71468	61029	57108	41797	38840	68744	59348	05120	30184	35212	19349	37651	51451
86411	48609	36678	42453	05061	43769	35948	87031	70767	13751	41770	94218	52578	36238	40475	15793	77152	23582	11510	87276
62598	12825	81744	28832	27365	81803	65846	92545	05055	22655	34918	90080	97862	84932	57494	33749	78745	73717	72328	43074
48775	02611	54265	18203	23340	84750	16317	88664	86842	06879	42898	91359	10406	31735	68812	92339	23815	38757	17882	98143
52679	19595	11883	74872	69181	01919	18447	10787	76246	80072	65021	03882	94463	96369	50001	18348	89408	84563	66422	62836
84496	81152	20719	23215	04349	54434	72364	93008	83282	31670	92752	87479	72596	20645	78439	11224	17405	27884	15573	12490
63964	53937	21417	49944	36356	98404	16480	17994	17161	49981	13229	29631	01944	76916	30063	98507	11345	29576	20215	53912
31191	75131	72364	11689	95727	08414	88727	45783	22468	77700	39111	13161	85208	70273	32016	04940	46728	60292	24831	06603
30445	68521	29450	41833	05622	88935	79047	27142	99257	37149	50872	93225	72359	32886	50662	62370	99461	50660	64680	30080
52373	91001	52315	28430	54175	30122	31796	98942	37600	28025	08190	28100	87859	03684	83762	03810	12735	75445	41946	36420
16386	18842	01076	99414	31574	94719	34656	80018	86988	79234	98140	53201	89156	99277	78211	78692	96992	80163	67882	36674
81841	86491	61191	23013	30272	23388	22443	63774	58176	14110	13106	02506	54140	43371	06930	26823	56025	73530	97542	19287
43563	68829	72818	08076	57080	13446	11014	98143	74989	26865	35106	03726	35458	62004	47084	24676	62125	68443	73712	82879
19945	84193	57591	77252	85604	45412	43556	27518	90572	00563	04446	93672	24118	40460	79818	51259	37345	49666	08518	04251
79374	23796	16919	90691	80276	32818	62953	78831	54195	70705	42890	46488	42173	78138	82275	95929	98821	60242	11810	02294
48503	26615	43980	05610	78289	66675	71799	58418	12642	40044	64856	84896	77627	86920	59181	24162	34918	77203	55518	17174
32049	65541	37937	41105	70106	60873	60380	59473	00787	00787	79719	02885	14169	81125	59040	59394	35494	25220	91424	94750
18547	71562	75449	54112	16855	44766	96156	71118	48702	42893	70750	97663	18316	18741	75016	01404	78331	76908	68195	18174
03180	94742	61446	43305	34143	96405	67803	17471	02261	29557	28895	56266	21108	23021	31950	37840	33674	81877	92490	35488
94822	24738	67744	83740	59799	25210	11053	62925	72061	69991	58892	58844	04181	58470	13348	64277	43838	50362	08531	83388
34330	60599	85828	19152	68499	27977	35611	96240	62747	89529	79508	78596	96517	20553	41158	37805	14553	09919	11490	70231
47770	81537	59527	95674	76692	86420	69910	10020	72681	12532	13417	69195	68598	94550	06285	84134	82474	22329	82134	08283
56908	71192	50623	41215	14311	42834	80651	93750	59957	31211	15123	52351	28631	77941	90178	35276	27833	92494	88899	41958
32787	02189	80539	75927	75475	71965	11796	72140	48944	74156	34604	18686	05119	31756	47258	14945	98839	82051	86608	07022
52441	78392	11733	57703	29133	71164	55355	31006	25576	55790	51863	00432	27846	54577	84476	06652	88250	40187	29735	32621
22177	54723	18237	28449	04570	18882	07027	67101	06895	08915	65489	54535	60256	91285	81743	48426	56351	89166	52478	23931
18376	73460	68811	39602	34048	20589	05701	08249	74213	25220	86119	51900	04979	16358	06281	24569	62454	20589	08869	29291
57201	26810	97957	64729	64983	54983	71591	99014	87903	63875	01963	63121	66788	80260	61287	68893	26446	11608	07600	85392
34919	78901	59710	27396	07571	05665	11964	44134	00271	76358	52164	39197	60548	88382	81061	78861	02849	31033	76875	08340
33617	92159	71911	16501	57381	34262	41744	60491	57624	06962	91444	35684	80387	44627	11850	64019	02394	49058	60809	
70010	40964	95780	72418	52571	18415	64362	90616	38034	04309	09881	00351	14759	58624	50470	03348	23703	10959	39733	84954
19282	68447	35665	31510	59832	49181	21914	65742	49613	14231	09235	29309	17864	21691	59354	56599	99735	57626	55445	
91429	73228	13266	68795	40948	06208	63887	89339	47958	13056	13056	51186	32450	45564	53813	25279	66293	50352	41356	44487
91617	78391	33021	03861	86520	43363	43066	00948	84058	09803	96114	75971	70563	31703	85747	86469	78133	40130	46223	85913
91510	07625	05255	82354	93943	52725	43230	62668	79529	65964	47657	02006	33820	89370	60192	08248	10221	27154	31123	59019



DATE: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	Greater than 50% mix of snags, submerged logs, undercut banks, or other stable habitat.	30-50% mix of stable habitat; adequate habitat for maintenance of populations.	10-30% mix of stable habitat; habitat availability less than desirable.	Less than 10% mix of stable habitat; lack of habitat is obvious.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or runs virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal, sinuous pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
<b>6. Frequency of Riffles</b>  Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.	
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
<b>7. Channel Flow Status</b>  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
<b>8. Bank Vegetative Protection (score each bank)</b>  Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
<b>9. Bank Stability (score each bank)</b>  Banks stable; no evidence of erosion or bank failure; little potential for future problems.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in reach have areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>  Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.	
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0