

**COUNTY OF HUMBOLDT EXTRACTION REVIEW TEAM (CHERT)  
1998 POST-EXTRACTION REPORT**

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For the

Humboldt County Board of Supervisors

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This version represents the Final 1999 CHERT Post Extraction Report.**

## I. EXECUTIVE SUMMARY

This report represents the compilation and analysis of information on gravel extractions in the 1998 mining season in Humboldt County. Individual extraction designs recommended by CHERT (agent for Humboldt County Board of Supervisors) and approved by regulatory and trustee agencies (US Army Corps of Engineers, California Department of Fish and Game, California Coastal Commission) are summarized as well as operator performance in achieving approved designs and specifications. In 1998, CHERT reviewed 38 extraction areas distributed among 26 mining sites in Humboldt County (many sites had more than one extraction area). Primary conclusions drawn from this report are:

- ◆ Both the quality of extraction designs and monitoring information have steadily improved since 1992. With few exceptions, pre- and post-extraction submittals provided fairly clear information for evaluating mining proposals and performance in meeting approved plans.
- ◆ Extraction operations significantly varied from their approved extraction plans at 7 of the 26 sites reviewed. Where actual extraction volumes were significantly below the approved volumes, several sites were left in configurations inconsistent with reclamation criteria for instream mining (insufficient vertical offset of skim surface above low flow channel, insufficient horizontal buffer between extraction and/or graded areas and aquatic habitat features, closed depressions impeding drainage). Also, several operations which extracted the full approved volume deviated significantly from their approved plans and specifications in doing so. While this did not necessarily create adverse river configurations in all cases, it is important for operators to follow approved plans and specifications.
- ◆ The present deadline of November 1 for submitting post-extraction information substantially improves the likelihood of conducting post-extraction field reviews with adequate information prior to the onset of high flows. However, it may not allow sufficient time in the fall for correcting problems with extractions (such as over-extraction and post-extraction grading). This places added emphasis on avoiding the need for post-extraction grading by adhering closely to approved plans. A relatively early high flow event occurred on November 21, 1998. Had there been a need to re-grade extraction sites to correct problems with the post-extraction topography, there would have been insufficient time prior to bar inundation from this storm.
- ◆ Biological monitoring requirements in the Corps of Engineers Letter of Permission (LOP), while providing a limited basis for evaluating gravel mining effects over the long term, do not provide guidance for identifying potential impacts to aquatic resources in the near term or for improving mining practices. Consequently, results of biological monitoring to date should not be considered assessments of potential impacts of gravel mining on aquatic and riparian resources. As was mentioned last year, biological monitoring requirements should be critically reviewed to ensure meaningful data are collected cost-effectively. Also, there was inconsistency between operators in compliance with the existing requirements.
- ◆ The bed elevations in the lower Mad River remain degraded (lowered) due to historical over-mining. We interpret localized areas of aggradation that are evident from recent cross section surveys to be related to a series of high flow winters rather than unnecessary restrictions of annual mining volumes, as suggested by some. We anticipate receiving supplemental information on recent channel changes in the Humboldt Bay Municipal Water District reach in the very near future. We will incorporate this and other recently acquired topographic information into the existing data set to re-evaluate historical channel changes as soon as possible.

## II. INTRODUCTION

Following is the 1998 annual report of the County of Humboldt Extraction Review Team (CHERT) as authorized under the US Army Corps of Engineers (COE) Letter of Permission (LOP) adopted on August 19, 1996, and the Interim Monitoring Program for the Lower Eel and Van Duzen Rivers adopted by the Humboldt County Board of Supervisors on July 2, 1996. The adoption of these two programs enlarged the geographical extent of scientific overview of gravel extraction operations over that described in the 1992 Memorandum of Agreement (MOA) and Programmatic Environmental Impact Report on Gravel Removal from the Lower Mad River (certified by the Humboldt County Board of Supervisors on May 31, 1994). The MOA authorized the formation of a Mad River Scientific Committee, and the Mad River PEIR authorized the continuation of the scientific review process and changed the name of the committee to the Mad River Scientific Design and Review Committee (SDRC).

While the two County programs cover both the Lower Mad River and the Lower Eel and Van Duzen Rivers (representing most operations in the County), the LOP covers all instream gravel mining operations in Humboldt County, including parts of the Trinity River near Willow Creek, and several other rivers in the County. The County and federal programs are intended to overlap in process and, for the most part, geographical extent by incorporating scientific review by the CHERT. In addition, the CHERT coordinates with the California Department of Fish and Game (CDFG), which oversees gravel extraction through the 1603 Streambed Alteration Agreement process. For a description of the county and federal programs in general, and the role and function of the CHERT in particular, the reader is referred to the Interim Monitoring Program for the Lower Eel and Van Duzen Rivers and the LOP.

This report summarizes CHERT recommendations and COE approvals for volumes and design specifications of gravel extraction operations for the 1998 season, evaluations of how well operators and their consultants met the recommendations, and limited geomorphic analysis of river conditions and trends in the Mad River based on the available data. Photographic and topographic information on the Mad River, compiled by Mr. Bob Brown of Streamline Planning Consultants, was provided to the County Board of Supervisors in October 1998. CHERT was provided with this material in December by County staff. Additional Mad River digital terrain modeling data collected over five years will soon become available from the Humboldt Bay Municipal Water District. Also, historical topographic data, in the form of surveyed cross-sections, were recently made available by the Corps of Engineers. To ensure that this new information is duly considered in relation to the other information we have used on river topography from the Mad River, a licensed surveyor will be retained to review all the available topographic information and render a conclusion as to the accuracy and consistency of the data. Following this, we will incorporate all accurate information into a single data set and re-assess historical changes in river topography for the Mad River through the present. Without the opportunity to include all available information for re-evaluating historical channel changes, we felt it would have been premature to update the comprehensive geomorphic analysis of the Mad River with this report.

Substantial monitoring at mine operations on the Eel and other rivers began in 1995. A report on historical channel changes in the Lower Eel and Van Duzen rivers was to have been completed by the Corps of Engineers in 1998. We understand that the COE has dropped bedload sampling from the scope of work for this project. This is disappointing, as contemporary estimates of bedload transport (which can be used to determine the supply of gravel to a river reach) is crucial for determining safe levels of extraction. This COE project was not completed, thus the limited data available for this report did not justify an in-depth quantitative analysis at this time. However, we believe such an analysis, especially one that includes contemporary bedload transport data, is critically needed and should be performed at the earliest possible time. This remains an unfulfilled promise of the PEIR on Gravel Extraction in the Lower Eel and Van Duzen Rivers (1992). Moreover, we believe agencies should not grant new Conditional Use Permits (CUPs)

or other permits, or increases in existing permitted volumes, in Humboldt County until aggregate resource management plans, including reliable estimates of sustained yield, are in place.

A. Generalized Criteria for Mining in Humboldt County

1. Sustained Yield and Cumulative Effects

In order to minimize the potential cumulative effects of gravel extraction on the County's rivers, CHERT uses the concept of sustained yield. Sustained yield, as defined by CHERT, is the long-term annual average volume that can be safely extracted from a river reach without significantly increasing the risks of adverse effects on riparian habitat or infrastructure. At present, sustained yield has only been estimated for the Mad River (a best estimate of about 150,000 cubic yards per year). Consequently, mining volumes on other rivers are only constrained by site-specific conditions and/or by permitted volumes (vested rights and Conditional Use Permits, or CUPs). While this may be sufficient to avoid adverse impacts in areas with few mining operations, there is a potential to exceed sustained yield in river reaches where numerous mining sites are concentrated. As mentioned above, we hope to have a reliable estimate of sustained yield for the lower Eel and Van Duzen rivers in the near future, but this depends on analyses which are not presently authorized in the County's mining program

2. Site-Specific Considerations

All but one 1998 extraction site in Humboldt County were designed as skims on unvegetated or sparsely vegetated bar areas. Skim configurations were of two general forms: a bench located near the edge of the low flow channel (most common) and a planar skim of the crown of a bar. Horizontal limits of skims were laid out to conform to the overall shape of the bar, typically in a crescent shape. On large-amplitude meander bends, the upstream end of the bar was left undisturbed so as not to encourage meander cutoff.

Where significant clumps of vegetation (mostly willows) occurred near the edge of a proposed skim, the boundaries of the skim were realigned to avoid them. Where such vegetation was located in the interior of a skim, these clumps were left as undisturbed "islands" within the skim boundaries. In most extraction areas, designs included a vertical offset of 1-2 feet above the low water surface to confine the low flow channel. Commonly, this offset was tied to a light colored "silt band" found along the edge of the channel. This silt band provided a handy means to allow consistency in vertical offset for individual bars and between the numerous bars extracted along the river. Drainage of receding flows was provided by designing extraction surfaces which slope either directly toward (perpendicular to) the low flow channel or in a downstream direction.

### **III. 1998 GRAVEL MINING RECOMMENDATIONS AND OPERATOR PERFORMANCE**

In the 1998 extraction season, a total of 1,075,122 cubic yards (cy) was approved for Class A (annual extraction greater than 5,000 cy) operations in Humboldt County. Of this, 820,075 cy (or 76% of the approved volume) was actually extracted, as documented in post-extraction submittals from the operators. The following sections provide information specific to each operation in the County, segregated by river reach.

CHERT recommendations and other communications from the operators, their consultants, and agencies were compiled in numerous electronic mailings generated throughout the mining season. While this expedited the process of information exchange and approval of mining plans, no single report containing all recommendations was compiled. Consequently, this report is the only document summarizing all CHERT recommendations for the 1998 extraction season. In addition to comparing the recommended/approved and

extracted volumes, compliance is also evaluated by comparing the configuration of our recommendations on individual cross sections with the post-extraction bar surface configurations. We note specific operations where the actual extraction deviated significantly from our recommendations and approved mining plans, both in terms of extraction volumes and post-extraction bar configuration.

#### A. Mad River

In the 1998 extraction season, eleven extraction areas distributed among five operators on the Mad River were mined. The sum of all initial proposals received from operators totaled 389,000 cubic yards (cy), or about 239,000 cy above the best estimate of sustained yield (150,000 cy, as determined in the Technical Supplement to the Mad River PEIR). Table 1 shows the volumes recommended by CHERT, the actual extraction volumes (calculated by the operators' consultants from cross sections), and the deviations between recommended and actual volumes, expressed as a percentage.

As indicated in Table 1, total extraction recommended by CHERT on the Mad River for the 1998 season was approximately 207,000 cy. In August, 1998, the five Mad River gravel operators requested to have their volumes increased to 274,000 cy, or 67,000 cy over that recommended by CHERT. Despite objections of CHERT, the COE approved this increase based on a recommendation from Mr. Mitchell Swanson, consultant to Eureka Ready Mix. The operators then appealed to the Humboldt County Board of Supervisors for County approval of the increase. Following a hearing on October 6-7, the Board upheld their appeal for the additional gravel, bringing the total gravel volume approved for extraction on the Mad River to 265,795 cy (sum of all approved plans after the appeal process). CHERT reluctantly agreed to the increase, but requested that the Board's approval be conditioned to include the following:

- 1) that the Board re-affirm the present sustained yield management approach to gravel mining on the Mad River;
- 2) that the supplemental PEIR for gravel extraction on the Mad River be prepared in 1999 by an independent, outside group to ensure objectivity;
- 3) that the County arrange for an independent, outside scientific review of the sustained yield approach and volume estimate to attempt to gain consensus on a management approach to be included in the supplemental PEIR;
- 4) that bedload sampling be performed on the Mad River to provide a contemporary estimate of gravel recruitment to the lower river; and;
- 5) that additional channel monitoring occur upstream and downstream of the mined reach to better document off-site mining effects and geomorphic processes.

Of these, only number 1 was included in the Board's action. However, the Board directed staff to present a proposal to consider pursuant to item number 2. We understand that for legal or other reasons, the other conditions were not included in the Board's action at the hearing, but may be considered later in a separate forum.

#### 1. Comparison of Recommended, Approved and Extracted Volumes

As shown in Table 1, the total volume actually extracted in 1998 was approximately 223,362 cy. This volume is about 127% of that recommended by CHERT and 84% of that ultimately approved by the Board. Stated another way, the operators took only about 16,000 cy, or 27%, of the 59,000 cy granted on appeal for the river as a whole (about 43,000 cy less than the additional volume approved). Over-extraction occurred at

one site (Arcata Readimix, O'Neill Bar), however the total extraction volume for the Mad River was significantly less than that approved by the COE and the County.

Table 1. Recommended and extracted volumes for Mad River sites (in downstream order), 1998.

Site (code)	Approved Volume (cy)	Extracted Volume (cy)	Percentage Extracted
Guynup Upper Bar (GUY)	33,600	21,731	65%
Guynup Lower Bar (GUY)	13,900	8,871	64%
Emmerson Bar Area 1 (upper bar) (REA)	14,070	14,015	100%
Emmerson Bar Area 2 (lower bar) (REA)	16,000	13,682	86%
Blue Lake Bar (REA)	40,000	34,036	85%
Christie Bar (ERM)	50,000	43,019	86%
Johnson Bar (REA)	20,355	17,674	87%
Essex Bar (MFC)	5,000	4,154	83%
John-Spini Right Bank (ARM)	45,510	41,130	90%
John-Spini Left Bank (ARM)	17,070	13,800	81%
O'Neill Bar (ARM)	10,290	11,240	109%
<b>Total for Mad River</b>	<b>265,795</b>	<b>223,362</b>	<b>84%</b>

## 2. Summaries of Site-specific CHERT Recommendations and Post-Extraction Observations

Guynup Site (Mad River Sand and Gravel): Recommendations at this site consisted of skimming the unvegetated bar surfaces of the upper and lower bars adjacent to the low flow channel. The CHERT recommendations included a vertical offset of about 1.5 feet above the low water surface. The upper and lower bar skims were significantly under-extracted (Table 1). On the upper bar, this under-extraction left the skim area with undulating topography and several closed depressions (as indicated on cross sections and by post-extraction field review), similar to conditions observed in 1997. As such, the skimmed surface would not drain properly after inundation by river flows.

Emmerson Bar (Redwood Empire Aggregates): Recommendations at this site consisted of skimming the unvegetated bar surfaces adjacent to the right and left sides of the low flow channel (Areas 1 and 2, Table 1) with a cross-stream slope towards the low flow channel and a vertical offset of about 2 feet above the low water surface. The post-extraction surface in Area 1 was about 1-2 feet too low on extraction cross sections 14+00 and 4+00, thus compromising low flow channel confinement along the edge of the channel. Similarly, on Area 2, the post-extraction surface was too low on extraction cross section 2+00, the location of the summer crossing. This may have been due to excessive removal of bridge ramp fill material when the summer bridge was pulled. Also, an area immediately upstream of the end of the approved extraction area appeared to have been disturbed and possibly lowered in elevation. We were informed this was a temporary stockpile area and that some gravel may have been removed beyond the stockpile volume when the material was loaded into trucks and hauled away. No cross sections bisected this area, so this could not be confirmed by surveys.

Blue Lake Bar (Redwood Empire Aggregates): Recommendations at this site consisted of skimming the unvegetated bar surface adjacent to the right side of the low flow channel along the lower two-thirds of the bar with a cross-stream slope towards the low flow channel and a vertical offset of about 1.5 feet above the low water surface. The CHERT recommendation was generally well met at this site, with the exception that the extraction went slightly below (about 1 foot) the approved elevation on extraction cross section 6+00.

Plots of monitoring cross sections 10+00, 15+00, 38+00 and 42+00 did not extend up the left bank, but the corresponding electronic files for these cross sections appeared complete. Plots representing complete surveys of monitoring cross sections (including both riverbanks and the channel bottom) should be provided to CHERT with the pre-extraction or the post-extraction submittals.

Christie Bar (Eureka Ready Mix): Recommendations at this site consisted of skimming the unvegetated bar surface adjacent to the right side of the low flow channel along the downstream two-thirds of this bar. The CHERT recommendations included a vertical offset of about 1.5 feet above the low water surface. The CHERT recommendation was generally well-met at this site, with the exception that the extraction went slightly above (about 1 foot) the approved elevation near the middle part of the skim (on extraction cross sections 4+00 and 6+00), leaving a small berm alongside the low flow channel. In addition, the skim was about 1 foot too low at the downstream end (near extraction cross sections 8+00 and 10+00). No drainage problems were anticipated with this site.

Johnson Bar (Redwood Empire Aggregates): Recommendations at this site consisted of skimming the unvegetated bar surface adjacent to the left side of the low flow channel near the apex of this bar. The extraction plans included a vertical offset of about 1.5 feet above the low water surface, exclusion of vegetation clumps from the extraction area, and avoidance of backwater habitat areas near the downstream end of the site, as in 1997. The approved designs were well met at this bar.

Essex Bar (Mercer Fraser Company): Recommendations at this site consisted of skimming the unvegetated bar surface adjacent to the right side of the low flow channel. The CHERT recommendations included a vertical offset of about 1.5 feet above the low water surface with an essentially flat skim. This is a small bar, thus the likelihood of drainage problems arising from the flat, level skim was minimal. Recommendations were well met at this site.

Johnson-Spini Bar (Arcata Read Mix): Mining at this site consisted of skimming the unvegetated bar surfaces of an upper mid-channel bar to the right of the low flow channel and its counterpart to the left of the low flow channel (Johnson-Spini Right and Left Bank Bars, Table 1) and O'Neill Bar downstream. The approved plans resulted in a wide, flat skim on the upper Johnson-Spini Right Bank bar that overlapped with the construction site for a Caltrans project for seismic retrofit of the Highway 299 bridge. The construction project included construction and reclamation of temporary settling ponds located on the upper end of Johnson-Spini Right Bank bar. From the post-extraction field visit, it appeared that either extraction occurred upstream of the approved area and/or that post-extraction grading was done across both areas. This grading cause filling in of the upstream end of an overflow channel along the right channel margin, but we are not sure whether this was done by the operator or by the bridge contractor. The actual occurrence of events could not be discerned from materials provided. Post-extraction surveys on the Johnson-Spini Right Bank bar indicated that approved plans were generally well-met within the approved extraction area, with the exception of cross section 1 near the upper end, where the extraction was about 1.5 feet too low near the low flow channel.

The Johnson-Spini Left Bank Bar was skimmed flat over virtually the entire bar surface and was about four feet lower than the downstream end of the Johnson-Spini Right Bank bar just across the low flow channel. While the operator met the approved plans fairly well on this bar, we believe the skim was designed to be too low to preserve channel confinement. This was evidenced during the post-extraction field visit on November 19, 1998 at which time shallow, sheeting flow was observed on this bar while the extraction surface on the Johnson-Spini Right Bank bar just across the river was 1-2 feet above the water surface.

O'Neill Bar was extracted as a flat skim over virtually the entire bar surface. Post-extraction surveys on this bar indicated that approved plans were generally well-met within the approved extraction area, with the

exception of cross section 11 near the lower end, where the extraction was about 1 foot too low near the low flow channel. This probably explains the over-extraction from this bar shown in Table 1.

There were several problems with both pre- and post-extraction submittals for the Arcata Read Mix site:

- 1) No extraction cross sections were provided to us, as required in the LOP and complied with by all other operators on the river. Consequently, calculated extraction volumes may be inaccurate, particularly for Johnson-Spini Left Bank Bar where cross sections missed the widest part of the extraction area on this bar. Thus, use of the standard method for volume calculation (double end area) could significantly underestimate the actual volume of extraction, although an unexplained adjustment was made in the post-extraction volume calculations provided by Mr. Allan Nilsen, surveyor for Arcata Read Mix. In the future, extraction cross sections should be provided where there are significant gaps in monitoring cross sections on proposed extraction areas and a minimum of three cross sections (whether they be for long term monitoring or for extraction only, or both) should be provided on any area proposed for extraction.
- 2) We were never provided with an adequate air photo of the site clearly and accurately showing all extraction area boundaries and cross section locations.
- 3) Monitoring cross sections 3, 5, and 8-12 were not surveyed completely, as indicated in both the pre- and post-extraction materials. One or both riverbanks were missing from both the hard copy plots and corresponding electronic files for these cross sections. Plots representing complete surveys of monitoring cross sections (including both riverbanks and the channel bottom) should be provided to CHERT with the pre-extraction or the post-extraction submittals.
- 4) Cross section plots lacked verification that they were either prepared by, or their preparation was overseen by a land surveyor or professional engineer licensed by the State of California. This is a requirement of the LOP, and is provided on cross sections submitted by all other operators in the form of the licensed surveyor's registration stamp on all cross section plots.

## B. Main Stem Eel River

### 1. Comparison of Recommended, Approved and Extracted Volumes

As shown in Table 2, the total volume actually extracted on the main stem Eel River in 1998 was approximately 371,813 cy distributed among 14 areas at 11 sites. This volume is about 67% of that recommended by CHERT. While it appears that minor over-extraction occurred at one of the bars, the total extraction volume for the Eel River was significantly less than that recommended by CHERT.

Table 2. Recommended and extracted volumes for the Main Stem Eel River sites (in downstream order), 1998.

Site (code)	Recommended Volume (cy)	Extracted Volume (cy)	Percentage Extracted
PALCO (PAL) Bowlby Bar	29,900	0	0%
PALCO (PAL) South Fork Bar	28,900	21,217	73%
PALCO (PAL) Elinor Bar	29,400	17,600	60
PALCO (PAL) Three Mile Bridge Bar	29,500	23,800	81
PALCO (PAL) Dinner Creek Bar	23,407	18,827	78%
PALCO (PAL) Lower Truck Shop Bar	16,800	18,000	107%
Eureka Ready Mix (ERM) Hauck Bar	65,700	28,448	43%

Site (code)	Recommended Volume (cy)	Extracted Volume (cy)	Percentage Extracted
Hansen Site (HAN)	50,000	33,500	67%
Mercer Fraser Co (MFC) Sandy Prairie Area 1	90,000	76,000	84%
Mercer Fraser Co (MFC) Sandy Prairie Area 2	36,000	22,000	61%
Mercer Fraser Co (MFC) Sandy Prairie Area 3	27,450	0	0%
Mercer Fraser Co (MFC) Sandy Prairie Area 4	22,000	22,000	100%
Drake materials (DRA) Drake Bar	89,000	74,461	84%
Humboldt County (HUM) Worswick Bar	25,000	16,500	66%
<b>Total for Main Stem Eel River</b>	<b>561,057</b>	<b>371,813</b>	<b>66%</b>

## 2. Summaries of Site-specific CHERT Recommendations and Post-Extraction Observations

Bowlby Bar (PALCO): CHERT recommendations at this site consisted of accepting the operator’s proposal as originally submitted, which was to skim the inner (riverward) edge of a large, unvegetated, and frequently mobile point bar. The operator chose not to extract gravel from this bar in 1998.

South Fork Bar (PALCO): CHERT recommended approval of the operator’s proposal as submitted, which was to skim the inner (riverward) edge of a large, unvegetated, and frequently mobile point bar. The proposal left 2-3 feet of vertical offset from the low flow water surface. While this bar was significantly under-extracted, the final grade went slightly below (about 1 foot) approved mining designs at extraction cross section 6+00 and monitoring cross section SF-28. Also, the actual extraction area was made smaller than that approved by moving the upstream edge about 400 feet downstream, accounting for the under-extraction. No drainage problems are anticipated from these deviations from approved plans.

Elinor Bar (PALCO): The operator’s proposal for this site was to skim the riverward edge of a large, unvegetated, and frequently mobile point bar. CHERT recommendations at this site consisted of requesting changes to skim floor elevations to steepen the gradient slightly for drainage purposes while maintaining low flow channel confinement throughout the skim area. These modifications were incorporated into approved plans. The area was significantly under-extracted, but was left in good condition without depressions. The approved plans were well met at this site.

Three Mile Bridge Bar (PALCO): The operator’s proposal was to skim the riverward edge of a large, unvegetated, and frequently mobile lateral bar. CHERT recommendations were to realign the landward extraction edge to provide a greater buffer between the extraction area and a side channel along the landward edge of the bar. This modification was incorporated into approved plans, which were well met at this site.

Dinner Creek bar (PALCO): The operator’s proposal was to skim the crown of a large, unvegetated, and frequently mobile lateral bar. CHERT recommended approval of the operator’s proposal as submitted. The approved plans were well met at this site.

Lower Truck Shop Bar (PALCO): The operator’s proposal was to skim the crown of a large, unvegetated, and frequently mobile lateral bar. CHERT recommended approval of the operator’s proposal as submitted. The approved plans were well met at this site, although the extraction volume exceeded that approved by about 7% (Table 2).

Hauck Bar (Eureka Ready Mix): CHERT recommendations at this site consisted of accepting the operator’s proposal as submitted, which was to skim the inner (riverward edge) of bar on the right side of the channel

(part of the downstream edge of the Van Duzen River delta). Approved designs included about 2 feet of vertical offset from the low water surface. This bar was significantly under-extracted (Table 2). Under-extraction occurred due to post-extraction elevations being above design grade at cross sections in the upper two-thirds of the area. However, post-extraction cross sections showed a depression 1-2 feet deep near the riverward edge in the upper part of the area. Also, there appeared to be some filling of gravel (to about 2.5 feet in depth) adjacent to the low flow channel on extraction cross section 10+00 and a smaller amount on the next extraction cross section downstream (12+00) near the middle part of the area. Because the depression appears to open to the low flow channel at the lower end of the area, drainage should not be impaired. In the future, better grade control should be employed to ensure that extractions are carried out according to approved designs.

Hansen Bar (Charles Hansen, Sr.): CHERT recommendations at this site consisted of accepting without modification the operator's proposal, which was to skim the upper portions of a large, unvegetated, and frequently mobile mid-channel bar. The proposal left about 2 feet of vertical offset from the low flow water surface. While the volume extracted was less than that approved, the method of extraction deviated significantly from the approved extraction designs, as occurred in 1997. Post-extraction surveys indicated that extraction occurred only on the western half of the approved area, but was extracted about twice as deep as approved, with over-extraction depths ranging from 3.5 feet near the upper end to 2.5 feet near the lower end. The post-extraction condition will not likely result in serious adverse channel conditions, and CHERT would likely have concurred with a revision of this nature had it been requested. However, the operator chose not to request a change in approved plans and in our opinion the deviation from approved plans was a significant violation of his COE permit and CDFG 1603 Streambed Alteration Agreement. This is the second consecutive year where this operator failed to adhere to approved plans.

Sandy Prairie Bar (Mercer Fraser Co.): This bar feature is fairly complex, consisting of several high flow channels and intervening dissected bars. The extraction proposal consisted of skimming at five potential areas, one of which (Area 5) was to be located in the head of a secondary channel at the western edge of the active channel and would have involved clearing of small woody vegetation. The other four skim areas were more typical mid-channel and lateral bar deposits and were designed to avoid perennial vegetation. CHERT recommended the proposal be approved without modification, but also stated a preference that Area 5 be deleted from the mining plan and that Area 4 be expanded if the operator desired to make up volume lost by deleting Area 5. The operator chose to do this, thus Area 5 was not mined and Area 4 was expanded upstream, as recommended by CHERT. Recommended extraction plans were well met by the operator at this site.

Worswick Bar (Humboldt County Public Works Dept.): CHERT recommendations at this site consisted of accepting without modification the operator's proposal, which was to skim the inner (riverward) edge of a large, unvegetated, and frequently mobile lateral bar. The proposal left about 3 feet of vertical offset from the low flow water surface as well as a large horizontal buffer. Approved extraction was generally well met by the operator at this site except at extraction cross section 2, where a depression approximately 2 feet deep was left near the landward edge of the extraction area. As such, the skimmed surface would not drain properly after inundation by river flows.

Drake Bar (Drake Materials): CHERT recommendations at this site consisted of accepting the operator's proposal, as submitted, which was to skim the inner (riverward edge) of bar on the left side of the low flow channel. The site was significantly under-extracted, but in such a way that the post-extraction configuration was quite acceptable (drainage would be adequate and the extraction was consistent with local bar morphology). As was the case last year, this site provides a good example of how to conduct under-extraction without leaving the bar in an undesirable configuration.

C. South Fork Eel River

1. Comparison of Recommended and Extracted Volumes

As shown in Table 3, the total volume actually extracted on the South Fork Eel River in 1998 was approximately 66,630 cubic yards (cy). This volume is about 88% of that recommended by CHERT and approved by agencies.

Table 3. Recommended and extracted volumes for the South Fork Eel River sites (in downstream order), 1998.

Site (code)	Recommended Volume (cy)	Extracted Volume (cy)	Percentage Extracted
Mercer Fraser Co. (MFC) Cooks Valley, Area 1	15,350	12,617	82%
Mercer Fraser Co. (MFC) Cooks Valley, Area 2	8,475	8,540	101%
Mercer Fraser Co. (MFC) Cooks Valley, Area 3	11,525	11,364	99%
Randall Sand and Gravel (RAN) County Bar	5,000	3,554	71%
Randall Sand and Gravel (RAN) Home/Tooby Bar	30,000	28,967	97%
Wallan and Johnson (WAL) Bar	5,000	1,588	32%
<b>Total for South Fork Eel River</b>	<b>75,350</b>	<b>66,630</b>	<b>88%</b>

2. Summaries of Site-specific CHERT Recommendations and Post-Extraction Observations

Cooks Valley Site (Mercer Fraser Co.): This site straddles the line between Humboldt and Mendocino Counties. Three areas were proposed for skimming: Area 1 in Mendocino County and Areas 2 and 3 Humboldt County. Areas 1 and 2 are contiguous. A secondary channel flows along the right bank adjacent to Areas 1 and 2 and then crosses over upstream of Area 3. Modifications to the proposal were recommended by CHERT to raise skim elevations at the upper end of the bar (Area 1) and make adjustments to horizontal extraction limits to increase both horizontal and vertical buffers along the low flow channel. Approved mining plans were well met at this site.

Randall Site (Randall Sand and Gravel): CHERT recommendations for this site consisted of eliminating one of three areas proposed for extraction (Tooby Park Bar, adjacent to Tooby Park on the south bank) and enlarging by a similar volume the skim planned for Home/Tooby Bar. This is a large point bar, and a skim was designed on the downstream half of the bar. This recommendation was adopted in the approved plans. The other extraction area was located on a lateral bar, called “County Bar”, near the upstream end of the site, and consisted of a skim which avoided a strand of willows along the low flow channel margin.

Approved mining plans were reasonably well met on Home/Tooby Bar, but although the County Bar was under-extracted as a whole, over-extraction occurred on several cross sections (extraction cross sections 5+70 and 6+60). Also, there was an apparent error in post-extraction volume calculations between cross sections CX2-1 and T1 on Home/Tooby Bar. We believe the actual volume for this bar to be lower than that reported by about 3,000 cy and recommend the operator’s consultant review these calculations.

Wallan and Johnson Bar (Wallan and Johnson): The operator’s initial proposal was to skim a relatively small area along the right (landward) edge of a large, unvegetated, and frequently mobile lateral bar. CHERT noted that, as designed, the extraction would yield a greater volume of gravel than the 5,000 cy permitted for the site. We recommended that the landward edge be moved toward the low flow channel to leave a wider buffer between the extraction site and a side channel along the right bank. This would make the extraction area narrower and would also reduce the volume to keep within the permitted amount. CHERT also recommended that the historic practice of grading bar surfaces outside the extraction area be

discontinued to preserve bed armoring, allow establishment of riparian vegetation and improve aquatic habitat quality.

Post-extraction surveys indicated that the edge of extraction was actually moved closer to the side channel near the upstream end of the extraction area, as shown on monitoring cross section 2. Also, areas outside of the extraction-area boundary were graded after extraction and before post extraction cross section surveys were made on October 14th. Graded material was moved into and used to partially fill the extracted area. Post extraction cross sections were not obtained in the graded area upstream of the actual extraction site. Consequently, CHERT cannot calculate the volume extracted at this site but we know it is greater than the 1,588 cy reported by the operator's consultant.

A similar problem was noted last year. In 1997 and again in 1998, the entire bar feature from the bridge downstream to the lower end of the extraction site was disturbed by grading. This unnecessary practice greatly expands the area of bar-surface disturbance. As stated during proposal review, CHERT opposes this practice due to avoidable adverse environmental effects, such as:

- It prevents natural establishment and succession of riparian vegetation.
- It removes the bed armor layer and thus increases mobility and scour potential.
- Habitat quality for aquatic insects, young fish and amphibians is unnecessarily degraded.

Last year CHERT noted an obscure reference in the extraction plan which allowed this unnecessary disturbance. This year we received assurance from the operator's consultant that there would be no grading outside of the actual extraction area. (Please refer to CHERT email of September 22, 1998, CORPS email of September 28, 1998 and Streamline Planning Consultants email of October 1, 1998.) It is CHERT's opinion that the operator was out of compliance with approved plans.

D. Van Duzen River

1. Comparison of Recommended and Extracted Volumes

As shown in Table 4, the total volume actually extracted on the Van Duzen River in 1998 was approximately 119,070 cubic yards (cy). This volume is about 87% of that recommended by CHERT and approved by agencies.

Table 4. Recommended and extracted volumes for the Van Duzen River sites (in downstream order), 1998.

Site (code)	Recommended Volume (cy)	Extracted Volume (cy)	Percentage Extracted
Bess Site (BES) East Area	12,598	10,534	84%
Bess Site (BES) West Area	6,472	7,093	110%
Leland Rock (LEL) East Area	56,000	48,733	87%
Leland Rock (LEL) West Area (Dwellely Bar)	44,000	37,407	85%
<b>Total for Van Duzen River</b>	<b>119,070</b>	<b>103,767</b>	<b>87%</b>

2. Summaries of Site-specific CHERT Recommendations and Post-Extraction Observations

Bess Site (Tom Bess): Two extraction areas (east and west) were proposed for this site. Extraction areas consisted of skins on active, unvegetated bars on both sides of the river. The east area was located on a lateral bar along the left side of the low flow channel near the upstream end of the site, and the western area

was located on a lateral bar along the left side of the low flow channel near the downstream end of the site. After correction of numerous deficiencies in the pre-extraction materials submitted, CHERT recommended the operator's proposal be approved without modification. Post-extraction cross sections indicated that approved extraction was well met at this site.

Leland Rock Site (Leland Rock): CHERT recommendations for this site consisted of slight modifications to the operator's proposal, which consisted of two separate skim areas near the low flow channel at the mouth of the Van Duzen River. The larger area is upstream of the three bridges over the Van Duzen and was proposed as a skim on the upper one-third of the bar adjacent to the low flow channel. We recommended that the extraction area be raised slightly at the upper end and grade in a downstream direction to facilitate drainage and better preserve low flow channel confinement. This was included in approved plans.

The downstream area was located at the terminus of the Van Duzen River delta at the Eel River confluence, an area that is highly dynamic and dissected by numerous channels (braided). Extraction at this bar, known as Dwelley Bar, consisted of a skim adjacent to the left side of the primary low flow channel of the Van Duzen. CHERT recommended the proposal be accepted as submitted.

Following extraction on the eastern area, the operator submitted a revised plan for increasing the depth of cut on the western area to make up volume not extracted from the eastern area. CHERT recommended approval of this revision as submitted. The approved plans were well met at this site.

E. Miscellaneous Humboldt County Sites

1. Comparison of Recommended and Extracted Volumes

As shown in Table 5, the total volume actually extracted on miscellaneous sites in 1998 was approximately 54,503 cubic yards (cy). This volume is about 94% of that recommended by CHERT and approved by agencies.

Table 5. Recommended and extracted volumes for miscellaneous sites in Humboldt County (Trinity River, Larabee Creek), 1998.

Site (code)	Recommended Volume (cy)	Extracted Volume (cy)	Percentage Extracted
Hoopa Valley Ready Mix (ROW), Trinity River	5,000 (?)	4,343	87%
Mercer Fraser Co. (MFC) Trinity River	30,000	23,843	79%
Humboldt County (HUM), Charles Bar, Larabee Cr.	22,850	26,317	116%
<b>Total for miscellaneous sites</b>	<b>57,850</b>	<b>54,503</b>	<b>94%</b>

2. Summaries of Site-specific CHERT Recommendations and Post-Extraction Observations

Rowland Bar, Trinity River (Hoopa Valley Ready Mix): This site is located on the Trinity River in the Hoopa Indian Reservation. We had no pre-extraction proposal in our files, but we understand that one had been submitted to extract 26,000 cy by skimming a bar on the right side of the channel. We do not know what the approved volume was, thus the figure for this site in Table 5 may be inaccurate. During a site visit, CHERT was told that the actual extraction, which was already underway, would only involve removal of 5,000 to 7,000 cy. CHERT recommended that the skim be flat in the cross stream direction, but slope in a downstream direction parallel to the river's slope, and that the downstream end be feathered out to avoid leaving an upstream-facing berm. The summer water surface was not shown on the pre-extraction cross

sections, but the post-extraction cross sections indicated that there was only about one vertical foot of offset of the skim above the fall water surface. Future extraction designs should provide greater vertical offset at this site to better preserve low flow channel confinement.

Trinity River Bar (Mercer Fraser Co.): the proposal for this site consisted of a trench along the left bank of the Trinity River. Due to restrictions placed by the US Forest Service on their ownership (the upper half of the trench area), the upper part of the trench was revised to be a skim. This transitioned to a trench excavation downstream of the USFS boundary. CHERT recommendations for this site were to accept the proposal without modification. The approved plans were well met at this site.

Charles Bar, Larabee Creek (Humboldt County Public Works Dept.): This extraction was proposed as a dry trench through the middle part of a highly aggraded stream valley. Because of massive sedimentation due to nearby earthflows in tributary basins, the extraction area is severely aggraded and has multiple channels that have no surface flow most of the summer and early fall. Consequently, the site lacks lateral and point bar depositional features more typical of instream mining sites. CHERT recommended approval of extraction plans essentially as submitted, but recommended that an outflow channel be added at the downstream end of the extraction area to facilitate drainage.

Post-extraction cross section plots lacked representation of the approved plans, so comparison of the post-extraction conditions with the approved plans was difficult. We had to compare the post-extraction cross section plots with pre-extraction plots of a different scale. As best we could tell, post-extraction cross sections indicated approved widths were exceeded on nine cross sections and exceeded approved widths by up to 190 feet. Thus, the extraction area was significantly larger than that recommended by CHERT and approved by agencies. While this probably did not significantly worsen habitat conditions in the area (the area provides little habitat irrespective of mining due to massive aggradation), approved horizontal extraction limits were poorly met at this site. The approved volume was exceeded by about 16% at this site.

#### IV. SUMMARY OF RIVER CONDITIONS AND TRENDS

##### A. Mad River

The Mad River has undergone more rapid geomorphic changes since 1995 than in the early years of the scientific review program (1992-94), when winter flows were relatively low. As discussed later, the predominant changes have been in the river's planform (configuration of the river viewed from above, as in maps or air photos). Several meanders have tightened their radii and migrated downstream over the last decade (e.g., Blue Lake, Leavey, and Christie meander bends). This is a natural process in alluvial rivers and has resulted in large volumes of bank erosion in high flow years at several locations in the river reach near the City of Blue Lake. Minor planform change or bank erosion was observed in the river reach downstream from the Annie and Mary Railroad Bridge over the last five years.

##### 1. Bank Erosion

Table 6 gives Mad River bank erosion volumes by site for the years bracketed by monitoring data (cross sections and air photos). Bank erosion in the winter of 1997-98 was far lower than in 1996-97, most likely due to lower peak flows.

Table 6. Bank erosion volumes on the Mad River, 1993-98 (note: these are not tallied strictly by ownership, but by river feature; numbers are in cubic yards (cy) and rounded to the nearest 1000).

Bar	Bank	1993	1994	1995	1996	1997	1998	Total for
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								Period
Guynup	right	1,000	1,000	37,000	22,000	62,000	8,000	<b>131,000</b>
Guynup	left	0	0	0	0	9,000	3,000	<b>12,000</b>
Emmerson	left	6,000	1,000	25,000	0	53,000	23,000	<b>108,000</b>
Emmerson	right	0	0	17,000	0	0	0	<b>17,000</b>
Blue Lake	left	0	0	8,000	13,000	92,000	0	<b>113,000</b>
Blue Lake	right	0	0	1,000	0	0	0	<b>1,000</b>
Leavey	right	0	0	94,000	20,000	146,000	11,000	<b>271,000</b>
Christie	left	0	0	16,000	2,000	0	2,000	<b>20,000</b>
Christie	right	0	0	13,000	4,000	8,000	0	<b>25,000</b>
<b>Total</b>	<b>---</b>	<b>7,000</b>	<b>2,000</b>	<b>211,000</b>	<b>61,000</b>	<b>370,000</b>	<b>47,000</b>	<b>698,000</b>

The following lists the primary locations of recent bank erosion and potential hazards to developments within the active meander belt of the Mad River:

Guynup upper bar (right bank): Agricultural lands: no threat to major developments.

Guynup lower bar and Emmerson upper bar (contiguous) (left bank): Unstable bank is within 150 feet of Hatchery Road. It appears the channel may re-occupy its former (pre-1962) course to the south of Hatchery Road bridge. This bridge is undersized for the Mad River, and may be contributing to bank erosion immediately upstream.

Blue Lake Bar (left bank): Agricultural lands: no threat to major developments.

Blue Lake Bar (right bank): Only moderate erosion volumes, but threatened Blue Lake sewage treatment ponds. Threat has been reduced by recent bank armoring with rip-rap.

Leavey Bar (right bank): Unstable bank is presently about 180 feet from Highway 299 right of way. Continued downstream meander migration may erode through Christie Bar.

Christie Bar (left bank): Moderate erosion volumes. Agricultural lands: no threat to major developments.

Christie Bar (right bank): No erosion detected in 1998. Bank remains about 100 feet from Highway 299 right of way, but bank appears stable at this location (erosion which occurred in 1997 was upstream of the location where the river is close to the highway).

## 2. Sustained Yield

Sustained yield was estimated to be about 150,000 cy per year from analyzing over 30 years of data on the lower Mad River. The initial analysis was included in the Mad River PEIR and provided the basis for the present management program. The 1997 post extraction report updated this analysis. As mentioned earlier, a comprehensive re-evaluation of historical channel changes and sustained yield will be completed in the near future when supplemental data sources are reviewed, including: 1) digital terrain models of the Humboldt Bay Municipal Water District reach (between the Annie and Mary Railroad Bridge and the Highway 299 bridge), 2) photographic information provided by Mr. Bob Brown of Streamline Planning Consultants, and 3) COE river cross sections.

### B. Eel, South Fork Eel, and Van Duzen Rivers and Miscellaneous Humboldt County Rivers

At this time, no quantitative assessment has been made of river conditions and trends in the Lower Eel and Van Duzen or miscellaneous river systems in Humboldt County. For many of the sites on these rivers,

geomorphic monitoring (cross sections and aerial photographs) has only been collected in a fashion compatible with quantitative analysis for 2 or 3 years. Evaluating trends with such a short data set would not be very meaningful. However, compilation of data on the lower Eel and Van Duzen rivers, a task in progress by the COE, will add substantially to the informational database for geomorphic analyses when completed.

## **V. EVALUATION OF BIOLOGICAL MONITORING PROTOCOLS AND 1998 RESULTS**

We have reviewed the two 1998 reports from NRM (Final Report: 1998 Fisheries Monitoring Program for Gravel Extraction Operations on the Mad, Eel, Van Duzen, and Trinity Rivers (Halligan, 1999) and Amphibian and Reptile Monitoring Study: Humboldt County Gravel Extraction Operations: Final Report (Osborn, 1998)) and the LBJ Enterprises report on “Bird Species Monitoring on Selected Gravel Bars and Associated Riparian Habitat Along the Eel River” (Herrera, 1998). The NRM reports fulfill the COE’s requirements for fisheries and amphibian monitoring for operations covered by the reports (except as noted below).

The LBJ Enterprises report provides raw data on point location surveys. Herrera (1998) states (in cover letters to the individual operators), “The information in this interim package demonstrates that the 1998 surveys have been completed. Should you require a more in depth report on the bird life associated with the gravel operations for the 1998 operation season and permitting process, LBJ Enterprises can produce this as needed. In the interests of economy, we will not produce such lengthy documentation until it is specifically needed and the requirements outlined by the permitting agency.” Unlike the fisheries and amphibian monitoring that simply documents fish presence (and some assessment of direct mining effects as noted above), the bird survey report could provide assessments of direct effects of gravel operations. CHERT does not consider the bird monitoring completed until this is provided.

As we have stated before (CHERT 1997 Post Extraction Report), the COE biological monitoring plan cannot assess potential effects of gravel mining operations on the fishery, nor can it provide meaningful feedback for refining mining practices. There is no reference condition established against which to compare biological health in mined reaches with that in reaches unaffected by mining. To be meaningful, a monitoring plan must be developed that can test for realized and/or potential mining effects through comparison with reference conditions (absence of mining).

We agree with Mr. Halligan (p. 19) that the monitoring plan needs revision for riparian plants, amphibians, fish, and channel morphology and dynamics. CHERT comments on revising the COE’s monitoring requirements for the proposed LOP 98-1 were provided to the COE in June, 1998. We received no reply to our comments from the COE, nor were we notified about the status of LOP 98-1 (it seems to have been dropped).

Halligan (1999) attempts to assess some direct effects, e.g., noise and trenching turbidity, on juvenile salmonids. He concluded that there were likely no significant effects associated with these issues. We agree with his conclusions on both. However, other statements are unsubstantiated. For example, on p. 14, the monitoring was not capable of concluding, “In spite of high temperatures, juvenile steelhead appeared to be able to rear successfully in the lower mainstems, especially in the Mad River.” Presence alone does not equate with successful rearing.

Similarly, we cannot agree with Mr. Halligan’s conclusion (p. 19) that “I feel that the data collected to date appears to indicate that, at least for Humboldt county rivers, gravel extraction does not significantly affect water temperatures, salmonid migration movements, holding patterns with regard to noise impacts, or steelhead rearing locations”. Other than the conclusion of no apparent noise impacts, the monitoring results do not support this statement because there is no baseline, or reference condition, with respect to

water temperatures and juvenile rearing habitat (i.e., the abundance and quality of thermal refugia without gravel mining on the Mad River was not determined).

Amphibian monitoring was performed only on the Eel and Van Duzen rivers in 1998. Fisheries monitoring was apparently not performed on many 1998 extraction sites. No action, that we are aware of, was taken for similar violations of the monitoring plan requirements in 1997 (noted in the CHERT 1997 Post extraction Report). Given that monitoring must begin in early summer, e.g., for amphibian monitoring, CHERT will request the operators' consultants to provide an estimated timeline for monitoring with the pre-extraction submittals for 1999.

## **VI. RECOMMENDATIONS**

- ◆ In 1998, we were provided with oblique air photos for many sites. Prior to 1998, vertical air photos were provided. The obliques proved to be very difficult and time-consuming to use for locating features in the field and for office-based evaluations of mining proposals and post-extraction performance. We recommend that operators resume the practice of providing vertical air photos with pre-extraction submittals, and that approved extraction areas and cross section locations are accurately shown on the photos.
- ◆ All spring monitoring and extraction cross section surveys should include: 1) the current water surface, 2) the top of the silt band, if present, and 3) points in the wetted channel as far as is safely wadable. These will facilitate pre-extraction reviews and save time and money. These are in addition to monitoring guidelines already in place.
- ◆ Post-extraction cross sections should include the approved mining configuration overlaid onto the pre- and post-extraction survey data. This will expedite post-extraction reviews and save time and money.
- ◆ A brief narrative should be included with the post-extraction submittal. This should note such things as post-extraction grading, stockpile areas, and any other observations relevant to explanations of what took place before, during or after extraction.
- ◆ Finally, we believe that the lack of follow-up to enforce monitoring requirements is unfair to operators who go to the trouble, expense, and risk to comply. Therefore, we recommend that agencies ensure that all requirements are enforced with fairness and consistency. Moreover, if it cannot be demonstrated that certain biological monitoring requirements provide meaningful results which are then factored into adaptive management, then they should be revised to do so or dropped from the LOP and other regulatory programs.