PROPOSED FINAL

Program Environmental Impact Report

on

Gravel Removal from the Lower Mad River

SCH 92083049

September, 1993

Prepared by:

Humboldt County Planning and Building Department
Planning Division
3015 H Street • Eureka, CA • 95501-4484
Phone (707) 445-7541 • FAX (707) 445-7446

Thomas D. Conlon, Director
Sidnie L. Olson, Senior Planner

This is the **Proposed Final** Program Environmental Impact Report on Gravel Removal from the Lower Mad River (PEIR). The Proposed Final PEIR is being recirculated for public comment pursuant to Public Resources Code Section 21092.1. The comment period is for 45 days commencing on September 10, 1993 and ending on October 25, 1993. All comments on the Proposed Final must be received by the Planning and Building Department by 5:00 p.m., October 25, 1993. Comments on the Draft PEIR, which were not previously submitted, will not be accepted.

Pursuant to CEQA Section 15132, the Proposed Final PEIR consists of the following:

- Revisions to the Draft PEIR. Wherever possible, page numbers of the Proposed Final PEIR correspond to the page numbers of the Draft PEIR. Where appropriate, deletions are shown by strikeout, additions by underline and revision bars have been added to the left column for reference.

- Section 11.0, Comments and Responses to Draft PEIR, commencing on page 196 of the Proposed Final PEIR. Responses to significant environmental points raised in the comments have been prepared and incorporated into the Proposed Final PEIR.

- Attachment 1, the Aggregate Resources Management Plan. Which includes Attachment A, "Mad River Instream Aggregate Resource Management Concept Paper for Environmental Monitoring and Assessment" by Trinity Associates, September, 1993.

- Attachment 2, "Lower Mad River Annual Gravel Replenishment and Harvest Models 1962-1993" by Dr. Douglas Jager, July 16, 1993. This attachment estimates how various strategies for calculating allowable gravel harvest would have functioned on the lower Mad River during the period between 1962 and 1993.

- Attachment 3, 1993 MOA Extension Reports: Scientific Committee Gravel Extraction Recommendation Report; "Wildlife Report for the Lower Mad River, Humboldt County" by Mad River Biologists. The Gravel Extraction Recommendation Report specifies extraction prescriptions and amounts for 5 sites deemed suitable for gravel extraction during 1993. The biological survey completes the biological surveys that were missing from the Draft PEIR and provides valuable information concerning presence, or absence of individual species, including nesting habitats.

Written comments, and questions, should be directed to Sidnie L. Olson, Senior Planner, Planning Division of the Humboldt County Planning and Building Department, 3015 H Street • Eureka, CA • 95501-4484 • (707) 445-7541 • FAX (707) 445-7446

(Note: Kinko's-Eureka can hand collate the Proposed Final PEIR into your copy of the Draft PEIR at a minimal cost. Please contact Kinko's at 445-3334 for additional information)

The annual review is necessary to assure that the prescribed scope, method, type and intensity of operations for each year is consistent with the actual character of the Mad River for that year. The specific procedures, goals and policies will be developed with the ARMP. However, some examples of potential monitoring requirements for the annual review are discussed in Appendix N, 1993 CDFG 1603 Notification Process.

1.3a Implementation

As discussed in Section 1.2, above, six of the ten known surface mining operations have vested rights pursuant to Public Resources Code (PRC). Section 2776, two have been issued Conditional Use Permits and two are not permitted by the County. Because these operations already have the necessary entitlements to operate, the County's regulatory authority to implement, monitor and enforce the provisions of this PEIR (and the Aggregate Resources Management Plan) is very limited.

The County's regulatory authority is restricted to enforcing the Conditions of Approval and/or operational restrictions of each operation's approved reclamation plan and/or Conditional Use Permit. It is possible that for some operations, particularly those which were approved some years ago, that the County will have no regulatory authority to implement, monitor or enforce the recommendations of the PEIR.

One alternative which would allow the County to implement, monitor and enforce the provisions of this PEIR is having all the operators and the County enter into a "development agreement" or new Memorandum of Agreement (MOA). The agreement would include the Aggregate Resources Management Plan (ARMP) as an attachment and would require that the operators comply with the PEIR and ARMP. However, after discussions between staff and Bill Davis, the attorney for the operators, it was determined that the existing operators would not enter into any kind of agreement to implement the PEIR.

Because the County has very limited authority to implement mitigation, it will be forced to conclude under California Administrative Code (CAC), Section 15091 and 15093, that the impacts identified in the PEIR are significant and are within the responsibility and jurisdiction of another public agency. Therefore, regulatory authority for implementation, monitoring and enforcement of the PEIR automatically defaults to the state and federal trustee and responsible agencies. These agencies would include, but not be limited to, the California Department of Fish & Game, State Lands Commission, U.S. Fish & Wildlife Service and Army Corps of Engineers.

Pursuant to PRC 21081.6 "...a responsible agency, or a public agency having jurisdiction over natural resources affected by the project, shall either submit to the lead agency complete and detailed performance objectives for mitigation measures which would address the significant and environmental effects identified by the responsible agency or agency having jurisdiction over natural resources affected by the project, or refer the lead agency to appropriate, readily available guidelines or reference documents."

The responsible and trustee agencies, including the Department of Fish & Game, have not provided the County with complete and detailed performance objectives or referred the lead agency to appropriate, readily available guidelines or reference documents.

The conclusion of the County's involvement in the preparation of this PEIR (and ARMP) will be to present the state and federal trustee and responsible agencies with an environmental analysis of mining on the Mad River, and a preferred alternative with a list of recommended mitigation measures (see Sections 6.1 and 6.3).

Future mining operations, or operations which do not already have County entitlements, will be required, under the Conditions of Approval of the entitlement, to comply with the provisions of the PEIR and ARMP. In this way the County can have regulatory authority to implement, monitor and enforce the provisions of the PEIR and ARMP over new operations, or operations which do not already have County entitlements.

It should be made clear, however, that provided all the existing operators voluntarily agree to the provisions of the PEIR and ARMP, the County can ***act*** as the agency responsible for implementing, monitoring and enforcing the provisions of the PEIR and ARMP. Nevertheless, *voluntary* compliance by the operators does not grant the county regulatory authority.

1.4 Intended Use

The PEIR is to serve as a reference for the Humboldt County Planning and Building Department, the California Department of Fish and Game, and others, as described in Section 3.1 and Appendix I.

The PEIR will be used initially for the review and approval of an Aggregate Resource Management Plan. It will also serve as the foundation for environmental documents necessary for the review and approval of County and State permits for new/future mining operations; revisions or amendments to reclamation plans; and State agreements or approvals necessary for on-going surface mining operations.

1.5 Project Location and Geographic Scope

The project is located in Humboldt County on the north coast of California approximately 275 miles north of San Francisco, California and 75 miles south of Crescent City, California. The geographic scope of the PEIR is bank to bank along the Mad River from the former Sweasey Dam, river mile 19.6, to the Hammond Trail Bridge, river mile 3.6. The PEIR also includes the adjacent upland processing sites. See Maps 1.2-1 and 1.2-2.

The mouth of the Mad River (river mile 0), is currently located at about latitude 40°58′30″ North, longitude 124°07′30″ West (approximately the same latitude as Salt Lake City, Utah; Lincoln, Nebraska; and New York City, New York).

The lower end of the project is located between the City of Arcata and the community of McKinleyville, approximately 10 miles north of the City of Eureka, the County Seat. The middle reach is just south of the City of Blue Lake. The higher reach, near the former Sweasey Dam, is privately-owned timber land. Other communities that are near the project area are: Korbel, Glendale, and the West End Road area. See Maps 1.2-3 and 1.2-4 and Appendix A, Individual Site Details for specific locations of the mining operations covered under this PEIR.

Table 2.1-1a Recommended Mitigation Measures - Cross Reference to Draft Mitigation Measures

Impact No.	Draft Mitigation Measures, see Table 2.1-1	Recommended Mitigation Measure Number, See Section 6.5	Reference[1]
H_20Qlty-1·Turbidity during high flows	None required	N/A	
H_20Qlty-2·Summer Bridge placement causing turbidity	**H_20Qlty-2a**·Equipment out of live stream	1	
	H_20Qlty-2b·Installation done in accordance with regulations	2	
	H_20Qlty-2c·Installation notification	3	
H_20Qlty-3·Skimming creates shallow broad channel	**H_20Qlty-3a**·Annual review	4	
Morph-1·Bed degradation, impact on integrity of structures	**Morph-1a**·Extraction below replenishment	5	see Sections 6.0 - 6.5, and Attachments 1 and 2
	Morph-1b·Reconstruct/retrofit structures	deleted	2-2, 8-3, 9-2, 14-4, 15-9
Morph-2·Bed degradation, impact on aquatic habitat	**Morph-2a**·Implement mitigation measure **Morph-1a**	5	
Morph-3·Degradation on vegetation	**Morph-3a**·Implement mitigation measure **Morph-1a**	5	
	Morph-3b Revegetation plan	deleted	7-16, 14-3
Morph-4·Degradation causes bank collapse	**Morph-4a**·Implement mitigation measure **Morph-1a**	5	
	Morph-4b·Implement mitigation measure **Morph-3b**	deleted	7-16, 14-3
Morph-5·Degradation improves flood capacity	**Morph-5a**·Extraction in excess of replenishment	deleted	1-13
Morph-6·Trenching realigning low-flow channel	**Morph-6a**·Implement mitigation measure **H_20Qlty-3a**	4	
GndH_2O-1·Channel aggradation-higher water table effects percolation of leachfields and percolation ponds	**GndH_2O-1a**·Implement mitigation measure **Morph-5a**	deleted	1-13
	GndH_2O-1b·Rebuild ponds, leachfields	deleted	12-3
GndH_2O-2·Channel degradation - Blue Lake valley reach	**GndH_2O-2a**·Implement mitigation measure **Morph-1a**	5	
GndH_2O-3·Channel degradation-HBMWD Gorge reach	**GndH_2O-3a**·Implement mitigation measure **Morph-1a**	5	
Fish-1·Broad, shallow channel could be barrier to fish migration	**Fish-1a**·Implement mitigation measure **H_20Qlty-3a**	4	
Fish-2·Degradation impacts on migration at tributaries	**Fish-2a**·Implement mitigation measure **H_20Qlty-3a**	4	
	Fish-2b·Install fish ladders	deleted	not feasible
Fish-3·Morphology on spawning sites	**Fish-3a**·Implement mitigation measure **H_20Qlty-3a**	4	
	Fish-3b·No extraction during prime spawning and migration seasons	deleted	see ARMP
Fish-4·Spawning habitat between hatchery - Blue Lake bridge	**Fish-4a**·No gravel extraction in this reach	deleted	see ARMP

[1] Unless otherwise specified, references correspond to Comments on Draft PEIR, see Section 11.0)

Impact No.	Mitigation Measures	Recommended Mitigation Measure Number	Reference
	Fish-4b·Fish hatchery management	deleted	not feasible
	Fish-4c· Sacrifice spawning area and 1)Remove the 25 foot waterfall at Bug Creek 2)Remove cascade 5 miles up North Fork 3)Remove boulder cascade at Mill Creek	deleted	2-9
Fish-5·Summer bridges impact juvenile fish migration	**Fish-5a**·Bridge timing	6	
	Fish-5b·Inspection of bridge sites	deleted	see ARMP
	Fish-5c·Implement mitigation measure **H_2OQlty-2c**	3	
	Fish-5d Use woody debris	7	
Fish-6 Loss of riffles	**Fish-6a** Implement mitigation measure **H_2OQlty-3a**	4	
Fish-7 Loss of woody debris	**Fish-7a** Implement mitigation measure **H_2OQlty-3a**	4	
	Fish-7b Placement of new debris	8	
	Fish-7c Implement mitigation measure **Fish-5d**	7	
Wild-1 Loss of wildlife habitat	**Wild-1a** Implement mitigation measure **H_2OQlty-3a**	4	
	Wild-1b Haul road construction	9	
	Wild-1c Stockpiles not to encroach on riparian vegetation	10	
Wild-2 Noise on wildlife	None required	N/A	
Wild-3 Dust coating vegetation	**Wild-3a** Water roads	11	
	Wild-3b Implement mitigation measure **H_2OQlty-3a**	4	
Wild-4 Various bird and mammal species t	**Wild-4a** Implement mitigation measure **H_2OQlty-3a**	4	
Wild-5 Northern Red-legged Frog	**Wild-5a** Implement mitigation measure **H_2OQlty-3a**	4	
Wild-6 Foothill Yellow-legged Frog	**Wild-6a** Implement mitigation measure **H_2OQlty-3a**	4	
Wild-7 Northwestern Pond Turtle	**Wild-7a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-1 Mad River Sand & Gravel bar	**Veg-1a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-2 Emmerson bar, riparian patches	**Veg-2a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-3 Emmerson bar, pond	**Veg-3a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-4 Blue Lake bar	**Veg-4a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-5 Christie bar	**Veg-5a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-6 Johnson bar	**Veg-6a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-7 Essex bar	**Veg-7a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-8 Johnson-Spini bar	**Veg-8a** Implement mitigation measure **H_2OQlty-3a**	4	

Impact No.	Mitigation Measures	Recommended Mitigation Measure Number	Reference
Veg-9 Arcata ReadiMix bar	**Veg-9a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-10 Graham bar	**Veg-10a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-11 Simpson-Zabel bar	**Veg-11a** Implement mitigation measure **H_2OQlty-3a**	4	
Veg-12 upper Simpson bar	**Veg-12a** Implement mitigation measure **H_2OQlty-3a**	4	
Air-1 Exhaust emissions	None required	N/A	
Air-2 Generation of dust	**Air-2a** Implement mitigation measure **Wild-3a**	11	
	Air-2b Speed limit of 20 mph	12	
View-1 Blue Lake	None required	N/A	
View-2 West End Road	None required	N/A	
View-3 Giuntoli Lane	None required	N/A	
View-4 Highway 299	None required	N/A	
View-5 Northbank Road	None required	N/A	
View-6 From river bar	**View-6a** Grade and feather slopes	13	
Traffic-1 City of Blue Lake	**Traffic-1a** Road maintenance fund	deleted	9-4, 14-7
	Traffic-1b Speed limits	14	
	Traffic-1c Alternate truck route	deleted	9-5, 14-7
Noise-1 Mad River Sand & Gravel	None required	N/A	
Noise-2 Emmerson bar	None required	N/A	
Noise-3 Blue Lake bar	None required	N/A	
Noise-4 Johnson bar	None required	N/A	
Noise-5 Essex bar	None required	N/A	
Noise-6 Arcata ReadiMix	**Noise-6a** Double muffle trucks	deleted	not feasible
	Noise-6b Relocate entrance	deleted	not feasible
Noise-7 Graham bar	**Noise-7a** Operator to purchase residences	deleted	not feasible
Noise-8 Johnson-Zabel bar	None required	N/A	
Noise-9 River users	**Noise-9a** Double muffle	15	
	Noise-9b Operational hours	16	
PU&S-1 Mad River Fish Hatchery weir	**PU&S-1a** Implement mitigation measure **H_20Qlty-3a**	4	
	PU&S-1b Implement mitigation measure **Morph-1a**	5	
PU&S-2 RSP along the left bank, adjacent to the fish hatchery	**PU&S-2a** Implement mitigation measure **Morph-1a**	5	
	PU&S-2b Determine foundation elevation of the RSP	deleted	not mitigation
	PU&S-2c Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-3 Blue Lake bridge	**PU&S-3a** Implement mitigation measure **Morph-1a**	5	
	PU&S-3b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-4 Blue Lake right bank levee	**PU&S-4a** Implement mitigation measure **Morph-1a**	5	
	PU&S-4b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9

Impact No.	Mitigation Measures	Recommended Mitigation Measure Number	Reference
PU&S-5 Blue Lake sewage treatment ponds and levee	**PU&S-5a** Implement mitigation measure **Morph-1a**	5	
	PU&S-5b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-6 Highway 299 Mill Creek bridge	**PU&S-6a** Implement mitigation measure **Morph-1a**	5	
PU&S-7 North Coast Railroad Authority bridge	**PU&S-7a** Implement mitigation measure **Morph-1a**	5	
	PU&S-7b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-8 Glendale Drive bridge over Lindsey Creek	**PU&S-8a** Implement mitigation measure **Morph-1a**	5	
PU&S-9 Highway 299 bridge over Lindsey Creek	**PU&S-9a** Implement mitigation measure **Morph-1a**	5	
PU&S-10 Railroad trestle over Warren Creek	**PU&S-10a** Implement mitigation measure **Morph-1a**	5	
PU&S-11 Warren Creek Road bridge	**PU&S-11a** Implement mitigation measure **Morph-1a**	5	
PU&S-12 HBMWD reach	**PU&S-12a** Implement mitigation measure **Morph-1a**	5	
PU&S-13 upper HBMWD water pipe crossing	**PU&S-13a** Implement mitigation measure **Morph-1a**	5	
PU&S-14 lower HBMWD water pipe crossing	**PU&S-14a** Implement mitigation measure **Morph-1a**	5	
PU&S-15 U. S. Geological stream gaging station	None required	N/A	
PU&S-16 Highway 299 bridges	**PU&S-16a** Implement mitigation measure **Morph-1a**	5	
	PU&S-16b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-17 PG&E upper gas line crossing	**PU&S-17a** Implement mitigation measure **Morph-1a**	5	
PU&S-18 Highway 101 bridges	**PU&S-18a** Implement mitigation measure **Morph-1a**	5	
	PU&S-18b Implement mitigation measure **Morph-1b**	deleted	2-2, 8-3, 9-2, 14-4, 15-9
PU&S-19 Hammond Trail bridge	**PU&S-19a** Implement mitigation measure **Morph-1a**	5	
PU&S-20 Mad River Beach Road RSP	**PU&S-20a** Implement mitigation measure **Morph-1a**	5	
PU&S-21 Clam Beach Mad River RSP	**PU&S-21a** Implement mitigation measure **Morph-1a**	5	
Arch-1 Archaeological sites	**Arch-1a** Implement mitigation measures **Morph-1a**	5	
	Arch-1b Cease operations if archaeological materials found	17	
Rec-1 Trench hazards	**Rec-1a** Public safety plan	18	
	Rec-1b Break stockpiles	19	
	Rec-1c Trench wall slopes	20	
Rec-2 Summer bridges	**Rec-2a** Public safety plan	21	

5.5 Fisheries and Habitat

The County retained the Humboldt State University Institute for River Ecosystems to gather and analyze information on the effects of historic gravel extraction on the geomorphic character and fisheries habitat of the project area. Portions of the following section were adapted from the Institute report. See Appendix F for the complete report.

The main fishery resources of the lower Mad River are the five runs of anadromous salmonid species: fall chinook salmon, coho salmon, winter steelhead, summer steelhead, and coastal cutthroat trout. According to the American Fisheries Society, the fall chinook race and the coastal cutthroat trout are threatened by a moderate risk of extinction and the summer steelhead is threatened by a high risk of extinction, (Nehlsen, et al., 1991). No other fish of special concern has been identified in the Mad River. Some of the common species found in the lower Mad River are listed in Table 5.5-1.

Table 5.5-1 Common fish species found in the lower Mad River

• Chinook salmon	• Coho salmon
• Steelhead/Rainbow trout	• Coastal cutthroat
• Threespine stickleback	• Riffle sculpin
• Coastrange sculpin	• Staghorn sculpin
• Shiner surfperch	• Sacramento sucker
• Eulachon	• Pacific lamprey

The fisheries aspect of this PEIR will concentrate on the anadromous fish populations because they appear to be the most sensitive to the riverine conditions which are influenced by gravel extraction. The PEIR considerations are influenced by the Mad River Fish Hatchery, the species involved, adult migratory needs, spawning habitat concerns, summer habitat needs, and juvenile migration patterns.

The Mad River Fish Hatchery is presently raising and releasing yearling chinook salmon, yearling coho salmon, and yearling steelhead trout. Occasionally they also release catchable trout. In the past chinook fingerlings were also released. In terms of releasing fish, the PEIR is only concerned with their Mad River releases. Releases of yearlings or catchables in other waters are beyond the scope of this PEIR.

The Mad River Hatchery releases fish at various times. Generally their yearling chinook are released in October through December, after the water level and turbidity have risen. Yearling steelhead and coho are released during springtime high water, generally March and April. In the past they have attempted to stock the upper Mad River, but that program created a variety of management problems. Today, the Mad River fish are released at the hatchery.

Anadromous fish spawning takes place in the main channel and in several main tributaries. Downstream from the Mad River Hatchery, the main spawning tributaries are Warren Creek, Lindsay Creek, Mill Creek, and the North Fork Mad River. Lindsay Creek appears to be extremely important for both coastal cutthroat and coho salmon. On the main stem a 25-foot waterfall near Bug Creek, about 24 miles above the former Sweasey Dam site was modified in 1980 by blasting and is not longer a migration barrier to steelhead~~stops upstream migration~~. A steep cascade about five miles upstream on the North Fork of the Mad River prevents salmon migration and limits steelhead migration. If these barriers were removed, available spawning habitat in the Mad River Basin would approximately double.

Continued channel degradation in the lower Mad River could adversely influence fish migration into adjacent tributaries, particularly when flows are low to marginal. In theory, each partial barrier encountered by migrating fish causes delays and reduces the individual fish's energy reserves. Where the migratory path is long, these barriers cumulatively reduce the number of fish that are capable of completing the migration. A boulder cascade at the mouth of Mill Creek, installed to protect the Highway 299 bridge, may be creating a partial barrier. Partial barriers such as this, located relatively close to the ocean are important but are of less concern than barriers located far upstream, because the fish's energy reserves should remain relatively high during relatively short upstream migrations.

Some spawning takes place in the project area, mostly above Essex bar (Site No. 6), particularly during low-flow years when access to tributaries and the upper river is limited. According to CDFG (response to Draft PEIR, dated June 11, 1993) anecdotal information indicates spawning below the hatchery bridge every year. The magnitude and success of this spawning is unknown. The Mad River was surveyed in 1992 during drought conditions. Salmonids were observed spawning in tributaries and mainstem Mad River in all areas surveyed from Canon Creek to Hatchery Bridge. Consequently, portions of the project area have been used for both fish spawning and gravel extraction. Gravel extraction has the potential to adversely alter the morphology of spawning sites and the composition of spawning gravel. A qualitative survey by Dr. Trush found many pool tails on both mined and undisturbed reaches in the project area had sufficient water depth and a proper range of water velocities to support favorable spawning environment (Lehre, et al. 1993). No data was presented regarding the composition or quality of spawning gravel in mined and unmined reaches.

Spawning in this reach is strongly influenced by hatchery management practices. When ocean escapement is high, more fish return to the hatchery than are needed for hatchery egg production. Excess fish are left in the river. Usually there are hundreds of excess fish and infrequently, the rejected or excess fish number in the thousands. Fisheries biologists, and others suspect that hatchery fish and the progeny of excess hatchery fish compete with, and adversely affect, desirable wild juvenile stock. While some of t~~T~~he hatchery ~~estimates that about 50 percent of their~~ excess fish will spawn downstream from the hatchery somewhile ~~50 percent~~ may move upriver to spawn. The hatchery uses groundwater in its operations; and one of the reasons the fish tend to concentrate downriver may have to do with the scent of the groundwater released at the hatchery.

Spawning below the hatchery may have little chance of success due to the unstable nature of the alluvial river bed. Although more studies are needed, preliminary flow analysis indicates that, in this reach, the average daily flow in January is near 2,500 cfs and average daily flows of 3,000 cfs or more can occur, on about 30 to 60 days during the spawning season. Flows of that magnitude might effectively scour out, and severely limit salmonid redds in the unstable alluvium found in this reach. Furthermore, flows of that magnitude would introduce fine sediments to the redds which would infiltrate the redds and limit emergence of juveniles. Thus, spawning in this aggraded reach may be rather futile and the main beneficial fisheries use of the lower project area (below the hatchery) may be for adult migration up stream to more favorable spawning areas and juvenile migration downstream to the estuary and the ocean.

CDFG has stated (response to Draft PEIR, dated June 11, 1993) that "It is currently believed that most successful salmonid spawning occurs in tributaries because of scour during storm events. However, anecdotal information by anglers indicates that salmon spawn below the

hatchery bridge. These mainstem spawners are at risk of egg loss, depending on the individual redd site. Many Central Valley rivers subject to annual scour produce large natural populations. It is difficult to dismiss any potential salmon or steel head production area in light of the declining resources today. We believe that gravel extraction can continue without impacting spawning habitat."

This is a potential area of controversy. While some claim that this area is prime spawning ground and that gravel extraction should be limited or prohibited in this reach, others claim that spawning in this reach is abnormally high because of hatchery management practices. ~~Currently the majority of fish using this reach are rejected hatchery fish.~~ There is also the belief that spawning in this reach is generally unsuccessful due to the unstable nature of the channel bottom. If spawning were successful, the progeny would compete with preferred wild native fish at various juvenile stages during the rearing. Information from CDFG (response to Draft PEIR, dated June 11, 1993) indicates that the Mad River Hatchery has been scheduled to be without funding beyond fiscal year 1994-95. Only naturally produced fish will occur if the hatchery is closed.

6.0 ANALYSIS OF ALTERNATIVES

Pursuant to CEQA Guidelines Section 15126 (d) this section describes and evaluates a range of reasonable alternatives to the project, or to the location of the project, which could feasibly attain the basic objectives of the project. The focus of this section is on alternatives that are capable of eliminating significant adverse environmental effects or reducing them to a level of insignificance. The same environmental categories as presented in Section 5.0, Impacts and Mitigation Measures, are used to identify and compare the significant environmental impacts of the alternatives with the those of the project.

The County retained Dr. Douglas Jager[1] and Trinity Associates[2] to gather and analyze information on possible alternatives to the project. Portions of the following sections were adapted from these reports. See Attachment 2 for the complete report by Jager, and the Aggregate Resources Management Plan, Monitoring Section for the Trinity Associates report.

6.1 Description of Alternatives

Alternative 1 - Extraction equal to Replenishment

This alternative proposes that the total volume of material extracted from the Mad River in any year be equal to the replenishment rate. Although the Mad River has many characteristics of an aggraded river system, the adverse impacts identified for the project of continued bed degradation can result in significant impacts to the river system and environs. The primary purpose of this alternative is to lesson the various impacts.

Because of the professional debate over the calculation of the replenishment rate, the episodic nature of sediment transport and the enormous year-to-year variability in transport, the calculated replenishment rate may not correspond to the actual replenishment rate in any given year. If the calculation is high, then this alternative could result in continued bed degradation. If the calculation is low, bed aggradation can occur. For Section 6.2, Comparative Impacts of the Alternatives, the worst case, a high calculation resulting in bed degradation, is evaluated.

Alternative 2 - Extraction less than Replenishment

This alternative proposes that the total amount of material extracted from the Mad River in any year be less than the replenishment level. The actual determination of how far below replenishment extraction must be, will be discussed in the Aggregate Resource Management Plan (ARMP). The purpose of this alternative is to reduce the various identified impacts to a level of insignificance. Limiting extraction to less than replenishment is a mitigation measure used throughout the PEIR to reduce identified significant and potentially significant impacts to a level of insignificance (see mitigation measure Morph-1a).

As discussed above, calculation of the replenishment is not an exact science. This alternative would essentially create an error margin in case the calculation is high, thus assuring that bed degradation does not continue.

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1 "Lower Mad River Annual Gravel Replenishment and Harvest Models 1962-1993" by Dr. Douglas Jager, July 16, 1993.

2 "Mad River Instream Aggregate Resource Management Concept Paper for Environmental Monitoring and Assessment" by Trinity Associates, September, 1993.

Alternative 3 - Moratorium - No Extraction

This alternative proposes that the Board of Supervisors approve an ordinance that creates a moratorium prohibiting gravel extraction along the Mad River. Pursuant to the CEQA Guidelines, Section 15126(d)(2) the specific alternative of 'no project' must be evaluated. The intent of the 'no project' alternative is to determine the potential significant effects, should the project not be implemented or developed.

Because in this case, the 'project' is the on-going extraction of sand and gravel from the Mad River, and because 8 of the 10 sites covered under the EIR already have authorization to extract material, arguably the 'no project' alternative is the continued extraction of sand and

Although the technological feasibility of using glass or foamed glass in concrete has been shown by at least three research groups and one manufacturer, the cost of cullet ($40-$80/ton) as a substitute for sand or gravel ($10/ton) may present an economic barrier to its current use.

Alternative 6 - Digital Terrain Model (DTM)
This alternative for managing instream mining is a cost effective alternative to predictable models of bedload transport rates. It is an empirical approach to gathering objective data of river conditions for use by the implementing agency. DTM is a monitoring methodology and assessment concept to determine when aggregate can be excavated without causing river bed degradation.

Monitoring encompasses the entire bed of the bankfull channel for the Lower Mad River. In years when there is a net gain of gravel recruitment and excavation of instream aggregate occurs, it will be limited to those sites that have experienced gravel replenishment. The amount of aggregate that can be safely excavated each year is some percentage of the net amount gained. This alternative proposes that 10% of the net gain be reserved for the river system, while 90% of the net gain can be extracted.

Determining the appropriate percentage to be excavated is dependent on: the current conditions of the river bed; downstream/off-shore sediment needs; structural safety requirements; and aggregate demand. It is appropriate that these percentages be modified if, after successive years, it is determined that increased or decreased bed aggradation is required, or appropriate.

For a detailed discussion of this alternative, see Attachment 1, the Aggregate Resources Management Plan.

Alternative 7 - Extraction equals some Percentage of annual replenishment
Alternative 7a - Annual Harvest Equals 0.85 of Annual Replenishment
Under this alternative the amount going to the river and the amount harvested could both vary widely on an annual basis. But some gravel would go to the river every year (Jager).

Alternative 7b - Annual Harvest Is 0.85 of Average Annual Replenishment
The average annual replenishment would be recalculated each year. Under this alternative the amount reserved for the river each year could vary widely while the amount being harvested would be relatively uniform. This method would harvest 85 percent of the long-term average annual replenishment. Harvest rates would be slow to respond to wet and dry cycles. In some years the river would gain gravel and in some years it would lose gravel (Jager).

Alternative 7c - Annual Harvest Is 0.85 of 5-Year Average Annual Replenishment
Under this alternative the amount going to the river each year could vary widely while the amount being harvested would be relatively uniform. This method would harvest 85 percent of the 5-year average annual replenishment. A new 5-year average annual replenishment figure would be calculated each year. After 5 years the first year would be dropped from the calculations while the sixth year is added into the calculations. After the seventh year the second year would be dropped while the seventh year is added in, and so on. Compared to Alternative 2b, the amount reserved for the river would vary less and the amount harvested would vary more. The advantage is the harvest would adjust more readily to dry and wet

cycles. During most years the river would gain gravel and in some years it would lose gravel (Jager).

Alternative 7d - Annual Harvest is 0.85 of 10-Year Average Annual Replenishment
Under this alternative, the amount going to the river each year could vary widely wile the amount being harvested would be relatively uniform. This method would harvest 85 percent of the 10-year average annual replenishment. A new 10-year average annual replenishment figure would be calculated each year. After 10 years, the first year would be dropped from the calculations while the eleventh year would be added into the calculations, and so on. This alternative would adjust to dry or wet cycles, but not as quickly as in Alternative 2c. During most years the river would gain gravel and in some years it would lose gravel (Jager).

Alternative 7e - Reserve up to 25,000 Cubic Yards for the River each Year and Harvest the Rest
Under this alternative, the river would get some gravel, up to 25,000 cubic yards each year, and the industry could harvest the balance, if any. The amount going to the industry would vary widely and the amount going to the river would vary only when the annual replenishment drops below 25,000 cubic yards. Over time, while monitoring changes in river condition the amount that is reserved for the river can be modified (Jager).

Alternative 7f - Harvest 85 Percent of the 3-Year Average Annual Replenishment and Reserve the Rest For the River
This alternative allows the extraction rate to respond fairly quickly to annual changes in replenishment. It seems to provide the most reserved volume for the river while yielding relatively uniform harvest rates. A new 3-year average annual replenishment figure would be calculated each year. After 3 years the first year would be dropped from the calculations, while the fourth year is added into the calculations. After the fifth year, the second year would be dropped while the fifth year is added in, and so on (Jager).

Alternative 7g - Harvest 125,000 cubic yards or the average annual replenishment whichever is greater
Any remainder beyond 125,000 cubic yards is reserved for the river. This method produces relatively uniform and high harvests. However the volume reserved for the river is relatively low (Jager).

6.2 Comparative Impacts of the Alternatives

For a discussion of Alternative 6, see the Aggregate Resources Management Plan, Attachment 1. For a detailed discussion of Alternatives 7a through 7g, see Jager report, Attachment 2.

Because Alternative 6 and all the alternatives 7a through 7g, are based on extraction below replenishment, and extraction below replenishment has already been analyzed (See analysis of Alternative 2), no additional analysis of the comparative impacts of these added alternatives has been made.

- **Water Quality**

Alternative 1 - Extraction Equals Replenishment

Impacts to water quality under this alternative are similar to those of the project. However, the degree of impact is proportionately reduced as the percentage of material extracted is reduced.

Alternative 2 - Extraction Below Replenishment

Under this alternative, impacts on water quality would be significantly less than the impacts resulting from the project.

Alternative 3 - Moratorium

This alternative would protect all natural resources of the project area from impacts of gravel extraction operations. However, because of the dynamic nature of the river and the habitats associated with it, and the existing recreational use of the river, there may be impacts to water quality that are not a result of gravel extraction operations. For example, four-wheel drive vehicles often travel from one gravel bar to another by fording the low-flow Mad River. This has the potential to cause turbidity, as well as affecting fish and wildlife habitat areas.

Alternative 4 - Off-site Alternatives

Off-site river alternatives would have the same impacts on water quality, but these impacts would be shifted to other rivers within the County. Additionally, off-site quarry or terrace mining alternatives could result in similar, lessor or greater water quality impacts. The actual effects cannot be reasonably ascertained.

Alternative 5 - Alternate Technology

This alternative, alone, will have no impact on the water quality of the Mad River.

- **Channel Morphology/Gravel Recruitment**

Alternative 1 - Extraction Equals Replenishment

Impacts to channel morphology under this alternative are similar to those of the project. However, the degree of impact is proportionately reduced as the percentage of material extracted is reduced. The possibility of gravel recruitment is increased.

Alternative 2 - Extraction Below Replenishment

Under this alternative, impacts on channel morphology would be significantly less than the impacts resulting from the project. Gravel recruitment would be substantially increased.

Alternative 3 - Moratorium

This alternative would protect all natural resources of the project area from impacts of gravel extraction operations. However, because of the dynamic nature of the river and the habitats associated with it, and the existing recreational use of the river, there may

6.3 Comparative Environmental Superiority of Alternatives

In accordance with State CEQA Guidelines, a reasonable range of project alternatives have been evaluated to determine their environmental superiority. Based upon the foregoing evaluation, Alternative 3 - the Moratorium Alternative, is the "environmentally superior alternative". This alternative results in no new environmental impacts from gravel extraction operations, and the impacts identified are naturally occurring or result from public use of the Mad River under the public trust.

The alternatives are ranked in terms of their overall environmental superiority when compared to the project:

Alternative 3 Moratorium	Environmentally Superior: Impacts from gravel extraction are eliminated. The river and environs would naturally adjust to normal migration of the river and habitat, or normal changes and alterations to the river environment.
Alternative 2 in conjunction with Alternative 6 Extraction Below Replenishment using DTM to determine extraction amounts	**Environmentally Sound**: Because bed degradation would not continue, t~~T~~he majority of impacts, which are a result of bed degradation, would be substantially decreased, or eliminated.
Alternative 5 Alternate Technology	**Environmentally Sound**: Although many impacts cannot be reasonably ascertained and are too speculative to determine, it is believed~~expected~~ that ~~the~~ many~~majority of~~ impacts would be ~~significantly~~ decreased. This alternative affords the opportunity to reduce solid waste in the form of glass, generated by Humboldt County residents and businesses.
Alternative 1 Extraction Equal to Replenishment	Impacts similar to the project, although to a lesser degree.
Alternative 4 Off-site Alternatives	Impacts unknown and too speculative to determine~~similar or greater than the project~~

6.4 Conclusion

Pursuant to CEQA Guidelines Section 15126 (d)(5), the range of alternatives is governed by "rule of reason" that requires the EIR set forth only those alternatives necessary to permit a reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision-making and public participation. The EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

Alternative 1 Extraction Equal to Replenishment

This alternative would greatly lesson the impacts of the project. This is not the preferred alternative, ~~however it is a reasonable alternative to the project~~. This alternative must be rejected because there are some downstream reaches where degradation has created problems. Some of the annual upstream replenishment has to be left in the river to help sustain and improve the downstream degraded reaches. Generally, reserving 15 percent of the replenishment and harvesting the balance. Over time, while monitoring changes in river condition, the proportion of the replenishment that is reserved for the river can be modified (Jager, Attachment 2).

Alternative 2 Extraction Below Replenishment

This ~~is the preferred~~ alternative in conjunction with Alternative 6 is the preferred alternative (see Alternative 6 discussion below), it would significantly reduce identified impacts.

Alternative 3 Moratorium

This is the environmentally superior alternative, however, implementation of this alternative is remote and speculative. In order to implement this alternative the Board of Supervisors would be required to 'take' all existing authorized surface mining operations along the Mad River for public use (eminent domain). The County must pay just compensation for each site 'taken'. The actual market value is not known, however, on the bases of tax assessor information, the assessed value of the land and improvements for the authorized sites, is approximately $1,750,000.00. This is expected to be considerably less than the market value.

A moratorium prohibiting gravel extraction on the Mad River is not a recommended alternative to the project. CEQA does not require that the most environmentally superior alternative be the preferred alternative.

Alternative 4 Off-site Alternative

This is a reasonable alternative, however the potentially adverse environmental effects cannot be reasonably ascertained. In addition, the implementation is remote and speculative. There is no guarantee that the owners and/or operators of the off-site gravel bars, quarries or pits would be willing to allow the Mad River operators to extract or use material from these off-site sources. Also, there is no guarantee that these same owners and/or operators would sell aggregate, at a reasonable cost, to the Mad River operators.

Currently, there is no terrace mining in Humboldt County. It is expected that terrace mining could cause significant effects, in Sonoma County terrace mining has proven to cause significant adverse environmental impacts. Sonoma County can be used as a model, although the impacts in Humboldt County would reasonably be expected to be similar, there would be some substantial differences.

Pursuing off-site alternatives is encouraged, however because the implementation is remote and speculative, it is not recommended as an alternative to the project.

Alternative 5 Alternate Technology

There appears to be a debate over the applicability of materials such as cullet in replacing aggregate, the implementation of such alternate technology is remote and speculative. In a worst case example, cullet used to replace aggregate in asphalt could result in inferior roads that require extensive repairs and/or early replacement.

The effects of retrofitting existing processing facilities with the necessary equipment needed to recycle cullet into asphalt or concrete products is not known. This use of alternate technology is certainly encouraged, however because the effects are not known and because the implementation of the technology is remote and speculative, alternate technology is not recommended as an alternative to the project.

Alternative 6 - Digital Terrain Mapping (DTM)

An alternative to managing instream mining based upon predictive models of bedload transport rates, is the concept of monitoring which utilizes empirical measurements of the riverine landscape. Predictive models of river behavior or supply of sediments are only as good as the data upon which they are based and are limited by their underlying assumptions. Topographic and aerial photographic surveys report the field conditions as they actually exist. An empirical approach to gathering objective data of river conditions for use by decision makers is preferable to predictive models, in regulating instream mining.

6.5 RECOMMENDED MITIGATION MEASURES - PREFERRED ALTERNATIVE

The recommended mitigation measures, when implemented, and in conjunction with the preferred alternative, Alternative 2 in conjunction with Alternative 6 (see the ARMP), will reduce significant impacts identified in the PEIR to levels which are less than significant.

For identification and clarity, the recommended mitigation measures have been renumbered, and cross referenced to their corresponding reference binomial from the Draft PEIR.

Recommended Mitigation Measure No. 1 ----------$H_20Qlty-2a$
No equipment shall enter the live stream to install or remove summer bridges, without prior notification and approval from the monitoring agency.

Recommended Mitigation Measure No. 2 ---------- $H_20Qlty-2b$
All summer bridges shall be installed and removed in accordance with the adopted regulations of the monitoring agency/agencies.

Recommended Mitigation Measure No. 3 ----------$H_20Qlty-2c$
The operator shall notify the monitoring agency/agencies at least one working day in advance of installation or removal of all summer bridges. The monitoring agency/agencies may have a warden or other qualified person supervise the installation and removal of summer bridges.

Recommended Mitigation Measure No. 4 ----------$H_20Qlty-3a$
An annual review of each proposed extraction operation shall be completed the monitoring agency/agencies. The annual review shall evaluate the success of previous extraction prescriptions; monitor the dynamic character of the Mad River, taking into account seasonal flows and gravel replenishment; and restrict the scope, method, type and intensity of annual extraction operations. The annual review is discussed in detain in the ARMP.

Recommended Mitigation Measure No. 5 ----------**Morph-1a**
Total extraction volumes on the Mad River in any year shall be no greater than 85% of the three year average annual replenishment rate.

Recommended Mitigation Measure No. 6 ----------**Fish-5a**
The timing of summer bridge installation and removal shall be limited to June 1 through September 30 or as otherwise allowed by the California Department of Fish & Game.

Recommended Mitigation Measure No. 7 ----------**Fish-5d**
Operators may incorporate woody debris and shallow pools at selected sites to enhance summer juvenile habitat during summer bridge installation, if it can be shown by the operator, during annual review, that the use of such materials does not have the potential to cause an adverse environmental impact.

Recommended Mitigation Measure No. 8 ----------Fish-7b
To enhance summer juvenile fish habitat, operators may incorporate into their operations the placement of woody debris, shallow pools and structures that mimic the effects of natural habitat, if it can be shown by the operator, during annual review, that the use of such materials does not have the potential to cause an adverse environmental impact.

Recommended Mitigation Measure No. 9 ----------Wild-1b
No new haul roads shall be constructed through riparian vegetation without first consulting the monitoring agency/agencies. The monitoring agency/agencies shall determine, in consultation with the County Planning Department, if the proposed haul road will impact significant riparian vegetation. If the haul road will significantly effect established riparian vegetation, the haul road shall either be realigned or redesigned.

Recommended Mitigation Measure No. 10 ----------Wild-1c
All gravel stockpiles shall be maintained in such a manner to assure no encroachment into significant wildlife habitat.

Recommended Mitigation Measure No. 11 ----------Wild-3a
All extraction operations shall water non-paved haul roads at least twice a day. In addition all extraction and processing areas shall be watered as required by the North Coast Unified Air Quality Management District, or as necessary to reduce the level of fugitive dust to acceptable air quality standards.

Recommended Mitigation Measure No. 12 ----------Air-2b
A speed limit of 20 m.p.h. shall be observed by all operational traffic on on-site unpaved roads.

Recommended Mitigation Measure No. 13 ---------- View-6a
After extraction, all graded slopes shall be rounded and feathered into the existing terrain to avoid an artificially contoured appearance.

Recommended Mitigation Measure No. 14 ----------Traffic-1b
All operational truck traffic shall comply with the posted speed limits on all roads.

Recommended Mitigation Measure No. 15 ----------Noise-9a
All operational equipment used on the gravel bar shall have double mufflers installed.

Recommended Mitigation Measure No. 16 ----------Noise-9b
All gravel bar operations shall be limited to the hours of 9:00 a.m. to 5:00 p.m. Monday through Friday, unless specified otherwise in the entitlement or reclamation plan.

Recommended Mitigation Measure No. 17 ---------- Arch-1b
If concentrations of archaeological materials are encountered during any operations, all ground-disturbing work in that vicinity shall be halted. Work near the archaeological finds shall not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action.

Recommended Mitigation Measure No. 18 ---------- **Rec-1a**
Prior to any operations involving trenching, a public safety plan, which includes signs posted adjacent to trench areas, shall be prepared by the operator and submitted to the monitoring agency/agencies for review and approval.

Recommended Mitigation Measure No. 19 ---------- **Rec-1b**
For all trenching operations, on-site stockpiles adjacent to trenches shall be designed and maintained to facilitate easy egress by humans and animals from trenches.

Recommended Mitigation Measure No. 20 ---------- **Rec-1c**
For all trenching operations, one of the long-walls of the trench shall be graded/excavated at such an angle as to facilitate emergency escape by humans and animals from trenches.

Recommended Mitigation Measure No. 21 ---------- **Rec-2a**
Prior to placement of any summer bridge crossing, a public safety plan, which includes signs posted warning of summer bridge crossings, shall be prepared by the operator and submitted to the monitoring agency/agencies for review and approval.

11.0 COMMENTS AND RESPONSES TO DRAFT PEIR

Pursuant to CEQA Guidelines Section 15132, the following is a list of persons, organizations and public agencies that commented on the Draft PEIR, SCH 92083049:

Person, Organization or Public Agency	Identification Number	Comment Letter page no.	Response page no.
Redwood Region Audubon Society Lewis L. Klein, for the Conservation Committee	Letter No. 1	200	274
California Trout, Inc. Fred Neighbor	Letter No. 2	209	284
Sierra Club, Redwood Chapter, North Group Susie Van Kirk, Conservation Chair	Letter No. 3	216	286
Trinity Associates Aldaron Laird, Natural Resources Planner	Letter No. 4	219	287
Dun & Martinek William O. Davis	Letter No. 5	225	290
Bruce Hunner	Letter No. 6	236	294
David S. Krueger	Letter No. 7	237	295
Humboldt Bay Municipal Water District Royal E. McCarthy, President, Board of Directors	Letter No. 8	245	299
City of Blue Lake Richard S. Platz, City Attorney	Letter No. 9	248	302
North Coast Railroad Authority Stephen F. Crook, Acting Executive Director	Letter No. 10	251	304
State of California Department of Fish and Game Richard L. Elliott, Regional Manager	Letter No. 11	252	305
State of California California Regional Water Quality Control Board North Coast Region Thomas B. Dunbar, Associate Water Resource Control Engineer	Letter No. 12	258	309
State of California State Lands Commission Division of Environmental Planning and Management Environmental Review Section Mary Griggs	Letter No. 13	260	311
State of California Department of Transportation District 1, Transportation Planning Branch Cheryl S. Willis, Chief	Letter No. 14	262	312
State of California Department of Conservation Division of Mines and Geology Mined-Land Reclamation Project Stephen E. Oliva, Acting Environmental Program Coordinator, Office of Governmental and Environmental Relations	Letter No. 15	267	315
State of California Department of Forestry and Fire Protection Steve Hubbard, Environmental Coordinator	Letter No. 16	271	319
United States Department of the Interior Fish and Wildlife Service Ecological Services Wayne S. White, Field Supervisor	Letter No. 17	272	320

11.1 SUMMARY OF MAJOR ISSUES RAISED IN COMMENTS ON THE DRAFT PEIR

☞ **The Draft PEIR did not adequately discuss cumulative impacts.**

Section 1000 of the Fish and Game Code requires that "the department [of Fish & Game] shall expend such funds as may be necessary for biological research and field investigation and for the collection and diffusion of such statistics and information as shall pertain to the conservation, propagation, protection, and perpetuation of birds and the nests and eggs thereof, and of mammals, reptiles and fish."

Further, PRC, Section 21081.6 requires that "Prior to the close of the public review period for a draft environmental impact report..., a responsible agency, or a public agency having jurisdiction over natural resources affected by the project, shall either submit to the lead agency complete and detailed performance objectives for mitigation measures which would address the significant and environmental effects identified by the responsible agency or agency having jurisdiction over natural resources affected by the project, or refer the lead agency to appropriate, readily available guidelines or reference documents."

The responsible and trustee agencies, who are empowered by law to oversee the conservation, propagation, protection and perpetuation of the natural resources of the state, have not provided the County with the necessary mitigation measures, nor referred the lead agency to appropriate, readily available guidelines or reference documents.

Pursuant to CAC Sections 15144 and 15145, the County must use its best efforts to find out and disclose all that it reasonably can; and if a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact. In addition, CAC Section 15130 states: "The discussion [of cumulative impacts] should be guided by the standards of practicality and reasonableness."

Lacking the information from the trustee and responsible agencies, we have used our best efforts to find and disclose the cumulative impacts resulting from surface mining on the lower Mad River. Our efforts include hiring 12 consultants with knowledge in varying fields of natural resources, to prepare reports which include discussions on the potential impacts resulting from surface mining on their area of expertise and which propose mitigation measures to reduce the significance of those impacts (see Appendices and Attachments).

The consultants have generally agreed that the estimates of gravel recruitment and the associated cumulative environmental impacts of gravel extraction require a great deal of forecasting and are highly speculative. Therefore, based on the code section cited above, we believe that the discussion of cumulative impacts in the PEIR is practical and reasonable, and no further discussion is necessary.

☞ **The gravel recruitment estimate of 150,000 to 200,000 cubic yards per year, is either too high, or too low.**

G. Mathias Kondolf states in his report (Appendix B) that the complexity of sediment transport in natural rivers is such that prediction of river behavior is plagued with a significant degree of uncertainty. Further, he states:

> "The processes of bedload sediment transport in streams are still poorly understood. This is due, in large part, because it is generally not possible to observe the processes of bedload sediment transport directly, at least during times of greatest sediment transport. There is still basic disagreement among investigators about what goes on in streams during sediment transport...One reason sediment transport is so difficult to understand is the tremendous spatial and temporal variability in the processes of sediment production from the watershed, sediment delivery to the channel, transportation within the channel., and deposition in and along the channel."

Further, the 12 consultants that were hired to prepare reports for the PEIR generally agree that estimating gravel recruitment requires forecasting and speculation on the part of the person making the estimate.

As discussed above, CAC Sections 15144 and 15145 govern that the County should disclose all that it can and then terminate discussion. The reports and studies prepared by our consultants are based on the best available data and information, no further studies are proposed. It is understood that some discrepancies or disagreements over the replenishment rate will occur.

☞ **The procedure for implementation, enforcement and monitoring of the mitigation measures is not adequately described in the Draft PEIR.**

The Proposed Final PEIR includes the recommendations for the implementation, enforcement and monitoring of the recommended mitigation measures in the Aggregate Resources Management Plan (ARMP), Attachment 1. The ARMP describes the: pre-season and post-season review process; monitoring program; enforcement process; public participation process; procedure for biologic, fisheries and vegetative surveys; and the process for determining the annual extraction locations and amounts.

Pursuant to Public Resources Code Section 21092.1, the Proposed Final PEIR, including the ARMP is being recirculated. The comment period for the Proposed Final PEIR is scheduled for 45 days commencing September 10, 1993 and ending on October 25, 1993. Comments will only be accepted on the Proposed Final PEIR. Comments on the Draft PEIR, which were not previously submitted, will not be accepted.

☞ **Issues regarding Public Trust have not been addressed.**

The determination of Public Trust land/boundaries is a legal issue and is outside the scope of this PEIR. Nevertheless, the implementation of the ARMP and the recommended mitigation measures will reduce the impacts identified in the PEIR, regardless of the Public Trust boundaries or jurisdiction. Public Trust issues will be discussed in the staff report.

☞ **How will the PEIR and ARMP be Implemented.**

As discussed in Section 1.2 and 1.3a, six of the operations received vested right entitlements in 1975 by the State Legislature through adoption of the Surface Mining and Reclamation Act (SMARA); two operations have already received entitlements through the granting of Conditional Use Permits by the County; and two of the known operations have yet to determine their entitlements. Because these operations already have the necessary entitlements to operate, the County's regulatory authority to implement, monitor and enforce the provisions of the PEIR and ARMP is very limited.

The County's regulatory authority is restricted to enforcing the Conditions of Approval and/or operational restrictions of each operation's approved reclamation plan and where applicable, the Conditional Use Permit. Because the County has very limited authority to implement mitigation, regulatory authority for implementation, monitoring and enforcement of the PEIR and ARMP automatically defaults to the state and federal trustee and responsible agencies who have been empowered by law to oversee the conservation, propagation, protection and perpetuation of the natural resources of the state.

REDWOOD REGION AUDUBON SOCIETY
P.O. BOX 1054, EUREKA, CALIFORNIA 95502

Comment Letter Number 1

Attention: Sidnie L. Olson
Planning and Building Departments
County of Humboldt
3015 H Street
Eureka, CA 95501-4484

RRAS COMMENTS ON PDEIR for Gravel Removal from the Lower Mad River
SCH #92-083049 --- 7/2/93

INTRODUCTION & GENERAL COMMENTS

This appears not to be the usual kind of EIR. The County was required to prepare it, or have it prepared, as part of a MOA between several state agencies, the County, and three gravel operators on the Mad River. Within the MOA the EIR was designated to be "a programmatic EIR", and its declared purpose was to "evaluate the cumulative effects of gravel extraction operations on the natural resources of the Mad River...." This relatively unique impetus or origin, and its specially emphasized function makes it somewhat more difficult to evaluate for adequacy than would normally be the case. Adequacy of an EIR is easiest to judge when the project to be implemented is clearly defined. In this instance, it seems to be not altogether clear in the minds of the authors of this DEIR, what the project is. It is certainly not clear in the mind of this reader.

1-1

In an oblique fashion the PDEIR seem to indicate that the project is a management plan which hopefully will regulate the entitlements so that significant damage to public utilities and structures (facilities), public trust values, and natural resources does not occur. "This PEIR will be used to approve an Aggregate Resource Management Plan (ARMP) for sand and gravel extraction on the lower Mad River." -- pg. 2). For the Lead Agency this is really the only possible project since they have already approved entitlements with wholly inadequate review. Yet on the first page and next to last page (pg. 191) we are told that "The project is the extraction of sand and gravel from 10 sites along the lower Mad River." It is however admitted that "Unlike most projects which trigger an EIR, this is not a proposed activity. Eight of the ten sites already have County authorization to mine sand and gravel from the Mad River. " All this appears not be consistent with the rule that "An accurate stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." (County of Inyo v. City of Los Angeles (1977)

Part of the problem may be the multiple definitions given to Program EIR in the Guidelines.

Section 15168. **Program EIR**

(a) General. A program EIR is an EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:

(1) Geographically,

(2) As logical parts in the chain of contemplated actions,

(3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or

(4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

1-1 cont...

Clearly there are choices available as to how a program EIR will be defined. We believe that the project is or should have been the development of a regulatory program of rules, regulations, plans, or other general criteria to govern the conduct of gravel operations already entitled by the County. This focus is not clear within the DPEIR.

1-2

The DPEIR covers a wide range of topics. Background information on the physical setting and current permitting status of the 10 gravel operations is clearly presented. However within the text of Volume 1, the background information on the biological-environmental settings is sketchy and incomplete. In some cases this is rectified by the Consultant reports in Volume 2, but in some instances the material in Volume 1 is inconsistent with material in Volume 2. (Several examples are given below) Moreover it is clear from comments within the consultant reports that the collection of biologically critical data was severely impaired by limitations of time and season. Thus our judgment is that the empirical information and studies of the biological resources of river are very incomplete. Data sampling at critical periods, e.g. for seasonal breeding birds in riparian habitat, are totally lacking in this PDEIR. If this material is either not presented or to be provided only in the Final PEIR, the purpose of public and agency review and comment will have been subverted.

1-3

The impression created by many of the mitigation statements in the DPEIR that these matters would be covered in the "annual review" are an unjustifiable leap of pure faith. No implementable provision, no protocol, and no financial arrangements are discussed or presented in this EIR for any such work nor any standard developed by which impairment or improvement to biological values could be evaluated. This is particularly blatant with respect to the frequently repeated H_2OQlty-3a mitigation measure, the Annual Review.

If the annual review protocol outlined in Appendix J of the Program EIR by Rising Sun Enterprises, an agent for the major gravel operations, is meant to provide the substance for either mitigation measure H_2OQlty-3a (annual review) or a management program it inadequately deals with at least the following essential topics some of which have been identified in the DPEIR as areas where potentially significant impacts are likely to occur:

1-4

1. Consistent and reliable monitoring for biological, recreational, noise and traffic impacts, and cumulative and offsite impacts;
2. Responsibilities and jurisdiction of Planning Director relative to CDFG and other state agencies;
3. Secured role for meaningful public scrutiny of annual monitoring and gravel extraction data (some of which may be claimed to be proprietary), and input into revisions of reclamation practices and standards, and environmental protection measures;
4. Establishment of the baselines for maximum depth of extraction for the various mining methods;
5. Financing of required monitoring, particularly for necessary offsite monitoring;
6. Enforcement protocols and procedures;
7. Allocation of annual Gravel extraction amounts between operators.

The information necessary to regulate impairment to public trust values has not been directly addressed in this document. It should have been.

It is difficult to see how those agencies with responsibilities in the fields of recreation and natural resource protection will be able to responsibly base their decisionmaking with the mitigation and monitoring in these particular topical areas so vaguely defined and undeveloped in the DPEIR From our point of view the deferral of specified mitigation for biological and recreational impacts and the very sketchy formulation of monitoring proposals is a serious problem. The mitigation proposed in the DPEIR is inadequate assurance that instream gravel operations will not impair significant ecological, public trust and recreational values. Nor does the PEIR provide a convincing analysis of options that will.

1-5

This DPEIR will need recirculation and a new comment period when the annual regulatory and monitoring program has been fleshed out, and when the minimal data collection essential for

1-5 cont...

determining potential impacts on biological values has been made ready for public review. (SEE BELOW FOR more specific COMMENTS ON BOTANICAL AND BIOLOGICAL REPORTS)

This DEIR is valuable in that it firmly establishes that over the past 15 years, Humboldt County has managed its river resources poorly, ignoring both its own public trust and police power responsibilities and its own surface mining regulations and laws. Either by calculated or by casual indifference a very serious situation has been allowed to develop on the lower reaches of the Mad River

SPECIFIC COMMENTS

1-6

pg. 19 (Vegetation) There is some evidence and a good deal of well informed sentiment that North Coast Black Cottonwood Riparian Forest habitat should be listed within the California Natural Diversity Data Base as an endangered habitat type. (See Bulletin of the California Native Plant Society, Vol. 23, No.2 -- 1993)

1-7

pg. 28 --- In the spirit of emphasizing material that is already contained in DPEIR, I have underlined portions of the three most critical policies regulating mineral and energy resource extraction in the County's General Plan for purposes of putting into perspective the substantive material in this PDEIR.

3. **Ensure that adverse environmental effects are prevented or mitigated to the fullest extent feasible** and that mined lands are reclaimed to a usable condition which are readily adaptable for alternative land uses under the General Plan.

5. **Ensure** elimination of residual hazards to the public health and safety.

9. **Extraction of instream sand and gravel is not to exceed average annual replenishment** level (annual bedload), except when the bedload left from a previous flood is greater than the average annual replenishment or if the projects emphasize fishery enhancement, flood control or bank protection.

1-8

pg. 30 The conclusion that "...the mitigation measures proposed in this PEIR will ensure that gravel extraction on the Mad River conforms with the established goals and policies of the local coastal and general plans." is too optimistic. Several significant impacts will not be reduced to insignificance, and as discussed above and below many of the mitigation and monitoring measures are vague and undeveloped. Any assessment that the mitigation measures proposed in the PEIR will **ensure** that gravel extraction within the banks of the Mad River will conform to the General Plan is unwarranted and premature.

1-9

pg. 35 --- Without a better description or citation of what the "adopted" regulations of the RWQCB, USACOE,and CDFG are with respect to the installation and removal of summer bridges there is no way for the public to independently evaluate the conclusion that mitigation measure H_2OQlty-2b will mitigate the impacts of summer bridge installation and removal to insignificance.

1-10

pg. 36 --- As noted elsewhere in these comments, this mitigation measure is far to vaguely described to judge its effectiveness on this particular impact and the many others for which it is the primary proposed mitigation.

1-11

pg. 39 --- Mitigation Measure Morph-1a should be rewritten as follows:

Extraction volumes shall be below the **average** annual replenishment rate **as determined in this PEIR and as readjusted at approximately 5 year intervals based on the analysis of annual review data**.

This mitigation measure will assure that bed degradation does not continue, and will provide for bed aggradation. This mitigation measure, **effectively implemented and enforced over a long enough period of time**, will reduce the cumulative impacts of bed degradation to a level of insignificance. Monitoring shall be performed by the HCPD and CDFG **with all the collected data reviewable by other state agencies and the general public.**

1-12 pg. 40. Mitigation measure Morph-2a should have the following added as a final sentence. **Monitoring of aquatic habitat values shall be part of the annual review process.**

Mitigation Morph-3b should be rewritten as follows: The HCPD and CDFG shall develop [or have developed] by 1995, **a restoration, preservation and revegetation plan. Implementation of this plan will help restore and enhance already degraded riparian, riverine and wetland habitats. The costs of implementing this program will be paid for by the gravel operators.**

1-13 pg. 41 (Impact Morph-5) --- There are better alternatives for flood protection than allowing the river bed to continue to degrade.

1-14 pg. 59 --- The data supporting the conclusion that "Currently the majority of fish using this reach are rejected hatchery fish." should have been provided for public review and comment. This is one of those biological parameters that ought to be included within any annual or periodic review.

1-15 pg. 61 --- More information on the spawning, migration, and holding behavior and habitats of the Mad River Coastal Cutthroat trouts is needed. Since all or most of their Mad River habitat is within the public trust easement zone, the responsibility of demonstrating no harm should be borne by the gravel operators. Provisions for providing good data on this subject will have to be incorporated into some type of periodical review.

pg. 64 The river stretch between the Hatchery Road bridge (Blue Lake Bridge) and the Fish Hatchery is protected and noted as a significant spawning area in Section 1505 of the Fish and Game Code. That legislative declaration was made either in 1972 or prior to that date. It is difficult to believe that that declaration at that early date was made on the basis of rejected hatchery fish.

1-16 pg. 68 The value of riparian forests as wildlife habitat cannot be emphasized enough. One additional quote from a 1992 Oscar Larson report on the Biological Conditions in the Eel River Delta is offered as an example. "The values of riparian habitats for terrestrial wildlife are unparalleled within temperate-zone ecosystems, a conclusion which includes riparian habitats in the Eel River delta." pg. 24) Moreover as was stated above there is some evidence and a good deal of well informed sentiment that North Coast Black Cottonwood Riparian Forest habitat should be listed within the California Natural Diversity Data Base as an endangered habitat type. (See Bulletin of the California Native Plant Society, Vol. 23, No.2 -- 1993)

Given the importance of riparian habitat, and the mandates of CEQA and the MOA authorizing this PEIR to particularly analyze **cumulative** impacts, it is puzzling why there is no analysis of the cumulative effects of **past** gravel removals in combination with other types of developments impacting riparian forest, e.g. land clearing for development, firewood collection and timber and agricultural clearing. These should have been assessed in this DPEIR.

There may be effects of noise even on acclimatized wildlife. (See below for citations.)

1-17 pg. 72 "Bald Eagles are rare in Humboldt County [listed as endangered both in California and the United States. It is a California Protected Species.] Three nests are known in the county, one is above Korbel. Scattered sightings of Bald Eagles along the coastal portion of the Humboldt Bay area may refer to this pair and its offspring, or an occasional outside visitor. There are no current or proposed gravel operations in the vicinity of the Bald Eagle habitat."

In the final PEIR this statement has to be corrected, and also supplemented with relevant necessary information so far lacking. First, with the correction. All current and proposed gravel operations in this DEIR are ***IN*** Bald Eagle habitat. The Bald Eagle habitat in this area encompasses all those places the resident birds might be expected to feed on fish, or on other birds. This would include spent and living salmon, steelhead, cutthroat trout and all other instream Mad River fish above a minimal size. Since this was clearly indicated in the Consultant's report (Appendix D, pg. 11 -- "care must be taken to preserve the integrity of salmon and steelhead habitat in the study area as these are the main food sources for Bald Eagles locally."), it is possible that the writer of the DEIR meant just in the vicinity of a known Bald Eagle nest. But even if that were the meaning, it requires supplemental information. How close can a gravel operation be to Bald Eagle nest before we are assured that there will be no disturbances? As it stands, several operations listed

1-17 cont...

in this EIR are, I believe, within 1.5 miles of a known nest. One project proposed in the EIR may be closer (the upper Simpson Bar). And at least one gravel operation which in the past has claimed exemption from SMARA and CEQA, a Simpson operation on the N. Fork of the Mad River, may be within 2 miles of the Bald Eagle Nest.

Will these gravel extraction operations be required to undergo a CEQA review for impacts on Bald Eagle habitat and nesting site before they are renewed or initiated, or is this DEIR going to be the only analysis that can be expected?

If the River-Aggregate Management Plan had been the project analyzed in this EIR, as it should have been, I expect that management protocols for the protection of this and all other significant biological values, would have been reasonably developed and could have been reviewed for impacts and likely success in this EIR. It is unfortunate that this was not done.

There are likely to be other Species of Special Concern on the lower Mad River that have not been noted in the DEIR, e.g. yellow-breasted Chat. Information collected on these and the breeding survey of wildlife which was to take place from April through June should be provided for public review and comment.

1-18

pg. 75 Mitigation measures Wild-1b and Wild-1c should be rewritten. Currently they read as follows:

Wild-1b --- No new haul roads shall be constructed through riparian vegetation without first consulting the County Planning Department and CDFG. CDFG shall determine, in consultation with the County Planning Department, if the proposed haul road ill impact significant riparian vegetation. If the haul road will significantly effect established riparian vegetation, the haul road shall either be realigned or redesigned. Monitoring will be performed by HCPD and CDFG.

Wild-1c --- All gravel stockpiles shall be maintained in such a manner to assure no encroachment into significant wildlife habitat occurs. Monitoring by CDFG.

It is suggested that the above two mitigation measures be rewritten as follows in order to comply with CEQA requirements and purposes for which this PEIR were prepared.

Wild-1b --- No new haul roads shall be constructed through riparian vegetation **without the County Planning Department first completing an Initial Study in consultation with the California Department of Fish and Game.** If the haul road will significantly effect established riparian vegetation, the haul road shall either be realigned or redesigned.

Wild-1c --- All **existing** gravel stockpiles shall be maintained in such a manner to assure no encroachment into significant wildlife habitat occurs. Monitoring by CDFG. **New stockpile areas shall require a Grading Permit. Potential environmental effects shall be assessed in an Initial Study. CDFG shall be consulted by the Humboldt County Planning Department prior to completion of the Initial Study.**

1-19

pg. 78 (Vegetation)

Given the mandates of CEQA and the MOA authorizing this PEIR to particularly analyze **cumulative** impacts, it is puzzling why there is no analysis of the cumulative effects of **past** gravel removals in combination with other types of developments on critical aspects of the vegetation: e.g. structural and taxonomic diversity, introduction of alien plant taxa and displacement of native flora. These types of cumulative impacts should have been assessed in this DPEIR yet there seems to have been almost a purposeful avoidance of the subject. "There has been no attempt to quantify vegetation removal and/or disruption, as the details of individual permit applications are not known at this time." (See also Sections 1 & 2 of Appendix H --- report of Karen Theiss & Associates)

It is hard to see how even the description of the current botanical situation can be considered close to adequate when the field survey was conducted in February and the consultant indicates that "Most of this area was either under water or had been recently inundated..." (Appendix H --- pg. 3)

When more intensive field studies, encompassing additional seasons have been performed, and some discussion and analysis of cumulative impacts has occurred, this section of the DPEIR should be recirculated to the public for additional review and comment.

1-20 pg. 83 --- The permitting and regulatory implications of some of the observations are vague and relatively uninformative. Part of the problem undoubtedly derives from the faulty project description as discussed above. For example, on this page it is stated that "These ponds and backwater areas likely meet the wetlands criteria of both the California Department of Fish and Game and the US Army Corps of Engineers." What regulations or mitigations are possible for possible impacts to these areas are not discussed. The original consultant's report Appendix H, pg. 3 indicates that the issue will have to be addressed on an individual permit basis in the future, but from the Lead Agency's perspective, all entitlements have already been issued without addressing the issue.

1-21 pgs. 85 -93 (Vegetation Impact Statements and Mitigation Measures)
The most frequently cited mitigation in this section is H_2OQlty-2b (Annual Review). Our comments on this mitigation measure are noted above.

1-22 pg. 110 (Traffic) The criteria used to determine what is an "acceptable Level of Service (LOS) should have been given. Both the criteria and the standard depend on the nature of the roads and the size of the community, and are not full standardized and non-controversial. Besides I do not think that the standards for an acceptable LOS have been adopted within the County General Plan (although I haven't had time to check this nor do I know whether the City of Blue Lake has adopted such a standard).

1-23 pg. 115 (Noise) --- "The County retained Rising Sun Enterprises to gather and analyze information on noise and traffic resulting from historic gravel extraction operations; and to analyze the effect of historic gravel extraction operations on the recreational use of the project area. (This could and should have been broadly interpreted as a mandate to inquire into how the noise and access limitations to the river imposed by active gravel operations has historically affected recreational opportunities and the nature of recreation along the Mad River. An analysis or discussion of these parameters seems to have avoided in this document and section with the exception of the author's conclusory statement that additional impacts have been brought on solely as a consequence of increased residential development and recreational use over the last 35 years. And I would take issue with these contentions as representing the whole and objective picture.

An additional component may be the increasingly widespread attitude that the primary, best, and highest use of our local river environments and public trust lands may not be for an extremely noisy type of industrial development. This is why a really first hand analysis of alternative sites for the extraction of aggregates is necessary. River habitats are likely to be too important to sacrifice, if other places can provide the materials or even some of the materials necessary even if at somewhat higher monetary costs.

1-24 pg. 117. "For the purpose of this study, noise measurements were taken by RSE, at and adjacent to the processing and extraction areas and nearby receptors. [???]. This is not altogether clear, particularly the usage jargon of "receptors". For river recreational purposes and for some wildlife impacts, the appropriate measurements should have been taken at those ***public trust locations*** nearest to the operations. As it is almost all the levels probably exceed those cited in the Humboldt County General Plan, and the Local Coastal Plans even when they are judged to be insignificant, e.g. Noise-8 pg. 127

The Local Coastal Plan standards are quoted below.

C. Standards for Industrial Development that Impact Residential Zones.
(1) **Noise.** All noise generating operations shall be buffered so that they do not exceed the exterior ambient noise level by more than 5 dB(A). ...

D. Standards for Industrial Development that Impact Non-Residential Zones.
(1) **Noise.** Mitigating measures shall be required where necessary to insure that noise generated by industrial operations does not exceed 70 dB(A) anywhere off the site premises.

1-24 cont...

Moreover there are also indications in the literature "that introduced noise is disruptive to normal functioning of a variety of wildlife species....And "[r]epeated exposure to elevated noise levels may be expected to result in long-term hearing loss and/or impairment, while single event noise exposure may result in short-term impairment." (Humboldt County Beach & Dunes Management Plan, 1992, pg. 131)

Some of the suggested mitigation measures if implemented will be at least partially effective in reducing the noise levels to nearby residences, e.g. Noise 7a pg. 126. But given the present state of aggregate extraction and processing, it may be impossible to adequately mitigate for noise impacts to public trust and recreational uses of the river, and in some cases for closeby residences or residences in unusual topographic relationships to a processing or excavation site. In my opinion this situation calls for an exceptionally broad, intensive, and possibly creative approach to mitigation possibilities, including attention to possible off-site mitigation measures. In the case of recreational and public trust uses, some attention to potential off-site portage and trail areas around and away from excavation sites should have been explored. For wildlife impacts restoration of riparian habitat sufficiently distant from gravel operations should have been considered. And for impacts to residences, in addition to buy outs (e.g.Noise-7a - pg. 126), funds for compensation or to provide additional insulation ought to have been explored. Certainly development restrictions on additional residential subdivisions in the area of established extractions should also be part of any mitigation package that will allow mining and processing in these areas to continue. And some sort of provision for requiring the incorporation of new noise reducing technologies as they become available should be incorporated as a mitigation measure.

In general, the investigation of mitigation measures for noise impacts in the DEIR is inadequate, although some of the suggested mitigation measures (Noise-7a, Noise 9a & b) may be partially effective in reducing some of the impacts.

1-25

Analysis of Alternatives (pgs. 173 - 188)

pg. 173 --- "The actual determination of how far below replenishment extraction must be, will be discussed in the Aggregate Resource Management Plan (ARMP)." It is incredible that this central aspect of any regulatory or mitigation program has not been discussed and evaluated in this document. If it will be left to a later Aggregate Resource Management Plan, this ARM will have to be circulated and analyzed in a subsequent EIR, and this would appear to defeat the purpose of this PEIR. ("This PEIR will be used to approve an Aggregate Resource Management Plan (ARMP) for sand and gravel extraction on the lower Mad River" --- pg. 2.) Moreover, if this aspect of mitigation is not effectively discussed in this PEIR, I believe that the only alternative available in this DEIR that could possible pass muster for legally adequate mitigation would be some variation of Alternative 3 --- a temporary moratorium.

1-26

pg. 179 --- Within the discussion of Water Quality - Alternative 3, there is some notice of other impacts to water quality which would continue or increase (the discussion is not at all focused here) despite a moratorium on gravel extraction. It would appear to me that in the context of the impacts of gravel operations on the river environment these additional impacts would have to be considered minimal, but if they aren't, and if important enough to receive attention and be considered important enough to detract from the environmental benefits accruing from a moratorium, they should have been included in the body of the EIR as part of the cumulative impact analysis.

1-27

pg. 179 & 180. --- The discussion of Channel Morphology/Recruitment - Alternative 3 includes the following statements. "This alternative would protect all natural resources of the project area from impacts of gravel extraction operations. However, because of the dynamic nature of the river and the habitats associated with it, and the existing recreational use of the river, there may be impacts to the channel morphology and gravel recruitment that are not a result of gravel extraction operations. For example, drought years will reduce the potential for gravel recruitment, and major flood events have the capacity to alter the river course."

1-27 cont...

It is difficult to see how the "existing recreational use" of the river would have a significant impact on Channel Morphology and Gravel Recruitment. Moreover, although it is true that flood events and drought years may have an enormous impact on gravel recruitment and channel morphology, how this relates to the benefits of a temporary moratorium is not clear. Surely, a several year moratorium on gravel extraction could significantly reduce the danger to public utilities and structures.

1-28

pg. 181 --- The impacts of poaching on the fisheries of the Mad River if believed to be potentially significant should have been incorporated into the cumulative impact analyses of this DPEIR.

1-29

Pg. 182 --- Negative impacts to riparian habitat in addition to those that have occurred as the consequence of gravel extraction should have been part of the cumulative impact analyses. Mitigation controls of any sort that would reduce the cumulative impacts should have been devised and discussed. Thus controls on the removal of riparian vegetation for other purposes, e.g. firewood, if they would alleviate the cumulative loss of riparian habitat should have been dealt with in this PEIR. This would be an essential component of any meaningful river management plan and should also have been included here.

1-30

Pg. 185 --- It is difficult to imagine how "existing recreational use of the river" could have a significant impact on exiting public utilities and structures.

1-31

Pg. 187 --- In the section discussing the comparative environmental superiority of alternatives, Alternative 4 is dismissed with the conclusion that impacts would be similar or greater than the project. There is not enough evidence nor analysis in this DPEIR to support that position. Nor is there enough evidence and analysis to support the statements on page 188 for this same alternative . The lack of evidence for a "guarantee" that owners of other sources of aggregate would be willing to sell aggregate to a specific group of operators at a "reasonable" cost does not make this alternative "remote and speculative." A reasonable analysis of alternative aggregate sources is an essential component of proper management, (See Appendix B -- Consultant Report of G. Mathias Kondolf) and should be part of any document that will be utilized to approve an Aggregate Resource Management Plan ("This PEIR will be used to approve an Aggregate Resource Management Plan (ARMP) for sand and gravel extraction on the lower Mad River" --- pg. 2.)

1-32

pg. 188. ---- Alternative 1 (the Extraction Equal to Replenishment Alternative) is mischaracterized here. It would not "greatly lessen the impacts of the project" it would only delay and perpetuate the severe cumulative effects documented in other parts of the PDEIR. For example, it would not in any way remedy or ameliorate the serious structural undercutting of bridges, revetment structures, nor solve the Ranney water collector and direct diversion facility problems of HBMWD.

The benefits of Alternative 2, (Extraction Below Replenishment) are overstated here. It would only reduce a few of the identified significant impacts, primarily those associated with channel degradation. It would have only minor ameliorative effects on Noise Impacts, Traffic Impacts, and cumulative impacts to riparian habitats.

Alternative 3 (Moratorium) appears to be correctly described as the environmentally superior alternative, however the dismal legal and financial implications depicted of imposing a moratorium appear to be highly exaggerated. It is hard to believe that a temporary moratorium of one to several years given the likely harm to the environment and public structures documented in the appendices of this DEIR would be judicially determined to be either a permanent or temporary taking. [See: *First English Evangelical, Lutheran Church of Glendale v. County of Los Angeles* 210 Cal.App.3d 1353; 258 Cal.Rptr. 893 (Cal.App. 2 Dist. 1989)]

1-33

Short-Term vs. Long-Term (pg. 191)

The discussion following the list of cumulative and long-term effects highlights some of the major problems in the way the "project" has been defined in this DPEIR. The appropriate project of this PEIR is really a program for the regulation of 8 gravel operations which received authorizations, entitlements, and plan approvals without the proper prior environmental review. Some believe that these activities can be regulated through an annual SMARA review process. The

1-33 cont...

plan for accomplishing this should have been the project or at least one of the major components of the project that this PEIR analyzed. This gravel management program, and its alternatives are not adequately described in this DPEIR. It is clear that continuation of these projects in the same manner that they have operated or been allowed to operate in the past may create irreparable harm to the environment, and other public trust values, in addition to damaging public facilities that will jeopardize public safety and can be remedied only at considerable expense to the taxpayer. "Meeting market demand for aggregate" is not adequate reason for a continuation of past bad practices or for not including what should have been included within this DEIR.

Thank you for your attention.

Lewis L. Klein
for the RRAS Conservation Committee

FRED NEIGHBOR
ATTORNEY AT LAW

494 H STREET
ARCATA, CALIFORNIA

TELEPHONE: (707) 822-3000

Comment Letter Number 2

June 30, 1993

Ms. Sidney Olson, Senior Planner
Humboldt County Planning Department
3015 H Street
Eureka, California 95501

Re: PEIR/Mad River

Dear Sidney:

2-1

California trout, for almost two years now, has been deeply concerned with the magnitude and methodology of gravel extraction on the Mad River. The Mad River constitutes an important river system with respect to the Coastal Cutthroat Trout, Steelhead and Salmon fishery it has historically sustained. Unfortunately, for numerous identified reasons (and for other yet identified reasons) the stocks of these fish have plummeted in the Mad River system. The Humboldt Chapter of the American Fisheries Society (AFS) in 1992 issued a paper entitled, "Stocks of Salmon, Steelhead and Cutthroat Trout of Northern California at Risk of Extinction" (Higgins, et al.), in which the salmon, Steelhead and Coastal Cutthroat trout of the Mad River were all listed as at risk of extinction.

Given the precarious status of these fish, we feel it is incumbent upon all of us to ensure that there is no further degradation of their habitat.

Additionally, California Trout has long been an advocate of the angler's right, pursuant to the California Constitution and the Public Trust Doctrine, to enjoy and utilize the resources of the navigable rivers, streams and lakes of our state.
The angler's right to enjoyment is not limited to only fishing. He or she has a right to enjoy the waterways, for their wildlife, scenic and aesthetic values. We endorse the holdings of our state's Supreme Court in National Audubon Society, et al. v. Supt. Court of Alpine County, et al., wherein the court affirmed that "the rights of the people in the navigable rivers of the state are paramount and controlling." It is the law of our state that among the purposes of the Public Trust in navigable waterways is the protection of recreational and ecological values.

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2-1 cont...

We believe the draft PEIR is replete with references to unmitigatable adverse significant impacts to the Mad River which constitute harm to the public trust interests. Specifically, the PEIR states at page 191 that if the "status quo" respecting gravel extraction on the Mad River is sustained, the following cumulative and long term effects would affect the state of the Mad River environment:

- Extraction of bed material in excess of replenishment by transport from upstream causes the bed to degrade upstream and downstream of the site of removal.
- Bed degradation can undermine bridge supports, pipe lines, or other structures.
- Degradation may change the morphology of the riverbed, which constitutes one aspect of the aquatic habitat.
- Degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could in turn affect the quality of aquatic habitat.
- If a flood plain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation.
- Bred degradation can impact or destroy wildlife habitat areas.
- Degradation can impact fish migration and spawning habitats.
- Rapid bed degradation may induce bank collapse and erosion by increasing the heights of banks.
- The reduction in size or height of bars can cause adjacent banks to erode more rapidly or to stabilize, depending on how much gravel is removed, the distribution of removal, and on the geometry of the particular bend.

All of these impacts will adversely impact the public trust resources of the Mad River. It is important to note that the PEIR is unequivocal, "If mitigation measures or alternative projects are not implemented, the above impacts will occur. The severity of the impact or how soon they will occur, depends upon the rate of bed degradation. The impacts would be significant and may be irreversible." (p. 191, emphasis added).

2-1 cont...

Additionally, the PEIR concludes that other trust resources will be impacted by the gravel operations. The viewsheds of and from the River will be adversely impacted and these impacts are unmitigatable. Noise impacts will be adverse and immitigable. Recreation and aesthetic values, because of noise, dust, viewshed impairments, access problems, potential dangerous and obtrusive trenching and stock-piling, will be significantly adversely impacted. Further, the PEIR suggests that summer bridge crossing could impede navigability of the River. Finally, the PEIR identifies the potential failure of almost all existing man-made structures which are located in or adjacent to the Mad River or its tributaries in the "project area." The PEIR fails to discuss the serious impacts of demolition and retrofitting/reconstruction of these structures. Clearly, these are foreseeable events given the PEIR conclusion that these structures "will" fail if the status quo is maintained. Under this scenario, the Lower Mad River, for the next generations, would be an area of not only gravel extraction, but constant major construction projects cleaning up and repairing damage to bridges, RSP's and other structures. This activity, besides being incredibly expensive, would, in effect, make the Mad River an industrial zone. The environmental impacts to the river would be serious and the Public Trust resources of The River further impaired.

2-2

2-3

The PEIR offers a very bleak picture of the Mad River environment if current authorized levels of gravel extraction are sustained. The PEIR suggests that the only meaningful method to mitigate for, and avoid, the identified impacts is to limit extraction of gravel to a level equal to, or (preferably) less than replenishment (p. 188). This is reasonable. However, as the PEIR suggests, the County, as Lead Agency, has absolutely no authority under its conventional permitting authority to impose this condition on the 10 operations which constitute "the project." All of the operations making up "the project" have already received legal entitlements to take prescribed amounts of gravel. The County has granted entitlements for in excess of 800,000 cubic yards, which is four times the amount determined to constitute what the river replenishes (200,000). The County has a problem! The river has a problem! We who care about the river have a problem!

2-4

How is the County going to legally impose its preferred mitigation measure/alternate (Alternative No. 2)? Failure to effect this alternative "will" cause major harm to the Mad River environment and the Public Trust Resources. Since there are no projects to approve subject to the PEIR, the proposed mitigation, while informationally important, is legally meaningless in light of conventional CEQA procedure. The PEIR is deficient because it fails to adequately discuss this problem.

2-4 cont...

While the PEIR, in a commendable manner, frankly discusses the environmental impacts of the ten gravel operations, and proposes, for the most part, reasonable mitigation, it has no "teeth." It cannot be legally imposed on the operators who have already been granted entitlements, through the conventional permitting process.

Therefore, I recommend the following to the County:

1. Hold certification of the PEIR in abeyance pending the following:

2. The County should conduct formal administrative hearings in which it would invoke its Public Trust responsibilities. The primary purpose of the hearings would be for the County to examine, under the existing entitlements granted for gravel extraction on the Mad River (a navigable river subject to the public trust doctrine) whether or not the resources subject to the Public Trust are harmed or imperiled. Further, the County should consider and weigh the conflicting and competing benefits of this matter. Finally, the County must consider in this process the holding of our Supreme Court in National Audubon Society v. Supt. Ct., "The Public Trust is more than an affirmation of the state's power to use public property for public purposes. It is an affirmation of the state's duties to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases, when the abandonment is consistent with the purposes of the trust. (Id., p. 33 Cal. 3d 419 at 441.)

3. If the County, in its discretion, after considering the evidence in this matter, finds that the entitled extraction volumes are imperiling or harming the Public Trust resources, then the County, under its legal powers, shall modify those existing entitlements so that they are consistent with the protection of the Public Trust resources.. At this point, the imposition of the preferred mitigation as identified in the PEIR, could be considered.

The legal propriety for this procedure is clearly established in the Mono Lake case, cited heretofore. This case, along with a long line of California and Federal cases, asserts that "Parties acquiring rights in Trust property generally hold those rights subject to the trust and cannot assert a vested right to use those rights in a manner harmful to the Trust." (National Audubon Society v. Supt. Ct., 33 Cal. 3d 419 at 437).

2-4 cont...

In fact, the courts hold that an impairment of the public trust constitutes a "public nuisance." (People v. Russ (1901) 132 Cal. 102.)

It is clear that the state not only "retains," but has a responsibility to retain, continuing control over its navigable waters. (Illinois Central Railroad Co. v. Illinois, 146 U.S. 387.)

The Supreme Court in Audubon emphasized that the state, by exercising their authority over the trust, property, was not "taking" the property from the grantee, but rather that the grantee holds the property subject to the public trust . . .." While he (the grantee) may assert a vested right to the servient tenement (the right of the use, subject to the trust) and to any improvements he erects, he can claim no vested right to bar recognition of the trust or state action to carry out its purpose." (Id. at p. 440.)

By implementing the above procedure, the County, as well as other state agencies, can establish reasonable and meaningful modalities in order to protect the public trust resources of the Mad River.

It is California Trout's contention that it is not just an "option" for the County to invoke its Public Trust responsibilities, but it is the County's legal duty to do so.

The PEIR is deficient and uncertifiable for the additional following reasons:

2-5

1. An EIR is to be prepared before the lead agency grants "any approval of a project subject to CEQA" so as to enable environmental to influence project program and design." (CEQA Guidelines 15004(a) and (b).) The Mad River PEIR is being prepared after approval of most gravel operations, and thus has no "influence on the project program or design . . .."

2-6

2. Public Resources Code requires mitigation measures to be "feasible" and capable of avoiding or minimizing "the identified impacts." (Guidelines 15370.) Because the County is not approving any projects pursuant to this action, it has no appropriate avenue to impose conditions of mitigation (on existing entitled operations). Thus, the PEIR's mitigation measures are not "feasible" and would not result in eliminating or reducing the significant impacts of the gravel operations.

2-7

3. The PEIR refers to the "Annual Review" as a method of mitigation for many significant impacts. However, "annual review" is never defined. We are told that an annual review ". . . will be developed with ARMP." (p. 3.) Courts have made clear that deferral of environmental assessment until after project approval violates CEQA. If the PEIR is going to serve as the environmental document for the ARMP, then a clear and informative description of the ARMP should be provided. Here, it is not, and thus the PEIR is deficient.

ANY SUBSEQUENT INCLUSION OF THE ARMP, BECAUSE IT WOULD SIGNIFICANTLY ALTER THE DESCRIPTION OF THE PROJECT, WOULD REQUIRE RECIRCULATION OF THE PEIR.

2-8

4. The PEIR is deficient because it fails to discuss important foreseeable impacts. Particularly, the PEIR fails to include a discussion of what impacts would occur if current gravel extraction is maintained and all or most structures are damaged. Additionally, the PEIR fails to discuss the rather sensitive issue of how lower extraction volumes would be allocated among the operators. As stated heretofore, mitigation measures must be "feasible." We need to know how lower extraction volumes will be imposed and enforced. Otherwise, on their face, these mitigation measures appear not to be feasible.

2-9

5. Under section 5.5, the PEIR suggestions "sacrificing" fish for gravel. Besides triggering Public Trust issues as discussed heretofore, this notion of "sacrificing" fish for gravel would require a statement of overriding considerations, which in turn would require specific findings and analysis (economic) that the gravel benefits outweighed the benefits of the fish.

2-10

6. The PEIR refers to an "excess" of "fish" around the Mad River Hatchery area. What kind of fish is the document referring to? It acknowledges that two kinds of Salmon, Coastal Cutthroat and Steelhead use the Mad River. I assume the document refers to hatchery-raised winter steelhead, which at times are abundant. However, given the precarious low numbers of Mad River Coho and Chinook salmon, if even a few of these fish were spawning in the project area, it is significant. The PEIR needs to be much more precise here, particularly since it is suggesting "sacrificing" fish that are already at a high risk for extinction.

2-11

Further, the PEIR needs to address more adequately the impacts caused by gravel extraction on the Coastal Cutthroat Trout (a species of concern); Particularly, in light of the fact that this species utilizes the riverine environment on a full time basis for two years before going to the ocean.

Thank you for your consideration in reviewing these comments.

Sincerely,

Fred Neighbor

FRED NEIGHBOR
for California Trout, Inc.

FN:kms

SIERRA CLUB
Redwood Chapter
North Group
POST OFFICE BOX 238
ARCATA, CALIFORNIA 95521

June 19, 1993

Comment Letter Number 3

JUN 22 1993

HUMBOLDT COUNTY
PLANNING COMMISSION

Sidnie L. Olson
Humboldt County Planning Department
3015 H Street
Eureka, CA 95501

RE: PEIR, Gravel Removal from the Lower Mad River

Dear Sidnie:

You and your colleagues, Melissa Martel-Accetta and Doug Jager, are to be commended for your successful completion of the Draft PEIR for the Mad River. With good supporting scientific reports, the document addresses the critical issues with which we have been concerned, i.e., the physical and biological conditions of the river. I appreciate the time that went into the preparation of the document and the personal commitment to the effort by all those involved.

3-1 My major criticisms of the document are 1) it fails to provide a process for implementing the primary mitigation measure of annual reviews and 2) the preferred alternative of Extraction Less Than Replenishment does not specify what that volume will be despite Lehre's report which determined replenishment volumes and recommended an extraction volume designed to restore channel stability. Annual adjustments should not exceed the 100,000 cubic yards recommended by Lehre.

3-2 At the Board of Supervisors meeting on June 14, Bill Davis suggested an extraction level this year of 300,000 cubic yards, three times what Lehre recommended on page 27 of his report. Mr. Davis was apparently basing this amount on the assumption that a good water year produces surplus gravel above what Lehre determined was the long-term mean annual recruitment level of about 150,000 cubic yards. But this is not what I understand Lehre to be saying. He made it quite clear and, in fact, he emphasized that "bed lowering is a persistent, long-term phenomenon related to long-term average replenishment and extraction rates, and for sustained yield the river must be managed on that basis." He went on to say that a "long-term mean annual extraction volume could be set, and extractors would have to manage their operations to live within that." He

3-2 cont...

emphasized the need for a "long-term balance" and if the management objective is to not simply maintain the status quo, but to actually induce recovery of the bed elevation, then the mean total extraction should be limited to no more than 100,000 cubic yards per year. (Lehre's report, page 27)

3-3

The major problem facing the County is that it has granted entitlements to over 750,000 cubic yards per year to five operators and itself, creating a difficult legal situation. It is the County's responsibility, as lead agency, to resolve this situation. It should not be left to the Department of Fish and Game in its 1603 process to determine who gets gravel and who doesn't or the total amount which will be removed. The PEIR's Alternative 2, Extraction Less Than Replenishment, must establish a volume and very importantly, a process with specific parameters for determining how that volume will be divided among the operators, based on the results of the annual reviews.

3-4

There are many questions, which should be dealt with now as part of this CEQA process, otherwise the public and the operators will continue to find themselves in an uncertain situation. If annual reviews indicate that some operators have gravel for removal and others don't, who will say that operators A and B get gravel, but operators C and D do not? Will the County make this decision or will it put the decision on the Department of Fish and Game as part of the 1603 process? And, will Fish and Game then say it doesn't have authority to deny 1603's when the County has granted entitlements? Will the operators point to their entitlements and cry "taking" if they aren't allowed to extract the volume of their entitlements? If the County adopts an alternative that restricts extraction to 100,000 each year, are all the operators going to get a share of this amount? Is it even economically realistic for all five operators to continue business when they only get a share of 100,000 cubic yards? Who will gather and interpret the annual review data? Who will decide, based on that data, volumes and locations of extraction?

Annual reviews in themselves do not mitigate the impacts of extraction in excess of replenishment or extraction in the wrong locations or extraction using inappropriate methods. Mitigation of negative environmental impacts will occur only when annual review data are analyzed and decisions from those analyses are made and implemented, based on objectives of river protection and restoration. Without a process for this to happen, annual reviews cannot be considered adequate mitigation. Annual reviews must include much more than gravel replenishment; they should evaluate a range of physical and biological conditions, including channel morphology, bank stability, fish habitat, riparian vegetation, wildlife, recreation, and aesthetic values, and the status of bridges and water district facilities.

3-5

I understand the County's and the operators' goal of getting an adopted final PEIR in place as quickly as possible in order to allow for extraction this season. However, I feel it would be a serious error for both the County and the operators to assume that adoption of an inadequate document will resolve the present situation. It will not.

As part of this CEQA review, it is imperative that a process be adopted for annual reviews and the decision-making to follow which will determine the amounts and locations of gravel extraction. It is my recommendation that the MOA for the Mad River be extended for this season with amounts and locations again determined by the Gravel Meisters, using the cross-sectional data from last fall and this year. This will give all of us the time to work out the process and parameters for annual reviews and develop the procedures and numbers for implementing an Extraction-Less-Than-Replenishment Alternative.

Thank you for consideration of these comments.

Sincerely yours,

Susie

Susie Van Kirk,
Conservation Chair

Comment Letter Number 4

TRINITY ASSOCIATES

Specializing in
Historical Analysis, Environmental Planning, and Site Analysis
of Riverine Systems

July 2, 1993

HUMBOLDT COUNTY PLANNING AND BUILDING DEPARTMENT
Planning Division
3015 H Street
Eureka, CA 95501

RE: Comments on Draft Program Environmental Impact Report, gravel removal from the Lower Mad River, SCH #92083049

4-1

1.2 Project

I commend the authors of the DPEIR for their efforts in preparing this document despite the problems posed by this project in complying with CEQA. The primary fault of the DPEIR lies not with its preparation, but in its absence of a true project as defined in CEQA under Section 15378. The project is described as the..."extraction of sand and gravel from 10 sites along the lower Mad River"...all of the sites are either vested, pending vesting or permitted. The project as described is not pending approval by the lead agency. Eight of the ten projects would not be subject to any findings made by the Lead Agency on certification of this PEIR. To impose exaction's as conditions on the existing operations would entail a taking or infringement on their approved entitlement's.

The use of an EIR is inappropriate in this case without a project subject to CEQA review. The Master Environmental Assessment as defined in Section 15169 is more appropriate of a document. A MEA would be invaluable in preparation for the development of a River or Aggregate Management Plan which would be a project under CEQA, and require a EIR.

1.3 PEIR Purpose and Objectives

4-2

How can this PEIR approve an as yet undefined Aggregate Management Plan for sand and gravel extraction on the lower Mad River? The ARMP proposes an annual review process to evaluate the success of previous extraction prescriptions. What are the criteria to be used in evaluating the success of these previous extraction prescriptions? The relationship of the ARMP to the PEIR is not clear. Is the ARMP proposed as mitigation to reduce the significant impacts of the existing mining operations? If this is the case the ARMP and its "specific procedures, goals and policies" must be included in the DPEIR for review, and not deferred to sometime in the future, which is illegal under CEQA.

1.5 Project Location and Geographic Scope

4-3

The DPEIR does not define "bank to bank", does this include the geomorphic bankfull channel and floodplain? The project should assess impacts from the mining operations to the entire river which include its floodplain as defined in Fluvial Geomorphology.

2.2 Areas of Controversy and Issues to be Resolved

4-4

The DPEIR does not reconcile the primary issue to be resolved, namely whether or not mining of aggregate from the bed of the Lower Mad River should continue at all. The alternative analysis of the DPEIR does not give credence to the fact that aggregate mining currently occurs successfully outside of river systems on Holocene alluvial deposits in other counties of the state. The DPEIR correctly points out that "Impacts resulting from bed degradation are the principal adverse effects caused by gravel extraction operations.". This would not be the case if mining did not occur in the river system, such adverse impacts would be avoided altogether.

4-5

Another significant issue to be resolved, but the DPEIR has not, is the need for a comprehensive River Management Plan if aggregate mining is to continue **in** the Lower Mad River. Such a RMP should entail an ARMP as one of its components. The scope and schedule for preparation and mechanism of implementing a RMP must be developed and described in the DPEIR. Better yet the RMP should be the project, requiring an EIR once the RMP has been prepared.

4-6

The issue of the location and extent of Sovereign Lands and the Public Trust Easement needs to be resolved in the DPEIR. The DPEIR can not assess the impacts of the aggregate operations to Sovereign Lands and the Public Trust Easement until their location is known and their resources are described. The 10 extraction operations are not vested when consideration is given to the State's Sovereign Lands and the Public Trust Easement. The DPEIR needs to be amended to address this still unresolved issue, and then be recirculated.

5.2 Channel Morphology/Gravel Recruitment

4-7

The PEIR proposes that through annual reviews the County will be guided in establishing the appropriate quantity, location, and methods of extraction. What are the evaluation criteria that the County proposes to utilize in determining the appropriate quantity, location, and methods of extraction? These criteria must be developed in the PEIR and submitted for review.

4-8

The DPEIR states that "Under sustained yield the channel will likely remain more or less stable.". Yet no facts are supplied to support such a finding. The use of the sustained yield concept is based on knowing or estimating the average annual bedload transport rate , and on knowing the average annual recruitment or replenishment volume. Allowing extraction to occur at the supposed "sustain yield" volume regardless of the actual volume recruited will assure that the river bed will degrade over time. During droughts or years with less than bankfull discharges there will be less material transported, replenished or recruited. Mining at "sustained yield" volumes during these low flow years will result in an accumulation of a deficit in sediment storage, causing the bed to degrade. It would take many years of above average recruitment to eliminate this deficit created from the fallacy of "sustained yield" harvesting of aggregate.

The DPEIR sites Dr. Lehre's estimate of average annual bedload transport rate of 150,000 to 200,000 cubic yards per year for the lower Mad River. The DPEIR goes onto to ..."recommend that the annual extraction levels should be about 125,000 cubic yards." The DPEIR uses Dr. Lehre's estimate of average annual bedload transport rates to establish a "sustained yield" volume of 125,000 cubic yards, but the DPEIR does not establish how that this volume of extraction will be distributed among the 10 sites or whether or not this volume is indeed not needed down river for the maintenance of the river bed elevation.

The DPEIR offers as its primary mitigation in preventing or reducing bed degradation caused by extraction, imposing limits on extraction volumes to ..."below the annual replenishment rate as determined by the annual review." This mitigation measure does not explain how it will measure replenishment rates, and how it will determine where extraction may occur, or how will the extraction volume be allocated among the 10 sites. In addition, this mitigation measure defers to a future review.

The DPEIR needs to expand its mitigation measures to: 1) Determine on an annual basis from empirical measurements the actual amount of **net** recruitment for the lower Mad River; 2) Identify the specific locations of the lower Mad River's **net** recruitment annually; 3) Limit the opportunity for extraction of aggregate at the 10 sites to only those years when the lower Mad River experiences a **net** recruitment; 4) In those years when extraction is permitted begin extraction at the lowermost sites first, and proceed upriver until that years extraction limit is reached; 5) Limit extraction volume and area at any of the 10 sites to only those areas where recruitment actually occurs and to the actual volume recruited on that site, during a year when there is **net** recruitment for the lower Mad River; 6) The lead agency should annually have an aerial photography survey completed of the lower Mad River. From this survey contour maps can be prepared of the entire lower Mad River depicting the surface topography above water elevation. This type of survey at one foot contours can be performed by most aerial photography firms. With this survey information available in digital formats such as DXF file, are compatible with ACAD software that most engineering, environmental consulting firms and public works departments have access to. From these data a cut and fill contour map can be generated that compares the difference between two different years surface topography. Preparing a cut and fill contour map would enable the lead agency to determine if there is a **net** recruitment of aggregate for the lower Mad River each year, and identify the specific location of that net recruitment of material and quantify the volume available at each site. The tools for comprehensive River Management Planning are available to the lead agency. Annual harvesting of aggregate should be limited to only those years when there is a **net** recruitment of aggregate for the lower Mad River, and limited to the specific sites where the **net** recruitment occurs.

4-8 cont...

6. Description of Alternatives

Alternative 1 - Extraction equal to Replenishment

4-9

The DPEIR states that for a number of reasons..."the calculated replenishment rate may not correspond to the actual replenishment rate in any given year." Predicting bedload transport rates or replenishment rates is very often speculative. However, measuring surface topography and measuring actual recruitment is not speculative. The science of surface measurements is very well developed with many qualified individuals available locally that do so in the course of their normal professional services.

4-10

The DPEIR discussion of this alternative is not correct. The total amount of material extracted from the lower Mad River can be limited to some percentage of the actual **net** recruitment, limited to the specific sites of recruitment, and limited to the actual volume recruited at that site. The PEIR must reevaluate the Comparative Impacts of the Alternative considering the net recruitment limitations as presented.

Alternative 2 - Extraction less than Replenishment

The DPEIR cannot defer development of this alternative to a future Aggregate Management Plan. If the ARMP is crucial to the evaluation of this alternative it should be provided in the DPEIR for review. The PEIR needs to reevaluate the Comparative Impacts of the Alternative with the ARMP fully developed.

Alternative 3 - Moratorium - No Extraction

4-11

The DPEIR is not correct in assuming that "the no project alternative is the continued extraction of sand and gravel from these authorized sites." While these sites may be vested to General Planning Ordinances or Mining Ordinances they are not vested to the States Sovereign rights or the Public Trust Doctrine. All 10 sites extract aggregate from the bed of the river that is replenished annually by the river's high flows. Until the State identifies where its Sovereign Lands and the Public Trust Easement are located, the possibility exists that all or part of the 10 sites may be on Sovereign Lands or in the Public Trust Easement. Under this situation the no project alternative can be considered, meaning a cessation of extraction from all or some of the sites. The PEIR needs to reevaluate the Comparative Impacts of the Alternative with an actual Moratorium - No Project alternative.

Alternative 4 - Off-site Alternatives

4-12

The DPEIR states repeatedly in its Comparative Impacts of the Alternative that the actual effects of off-site mining of terraces cannot be reasonably ascertained. This is not supported by the fact that terrace mining is not only common place throughout the state but in many locations it is the only form of extraction employed. The extraction of aggregate from Holocene deposits of alluvium is a very real alternative to mining the lower Mad River's bed. The feasibility of mining terraces has not been adequately developed. The impacts of mining terraces can ascertained with greater certainty than extraction in a dynamic river system. The requirements for comprehensive river management by the lead agency with its limitation of staff, time, and funds certainly makes mining from terraces appear to be a viable alternative needing to be developed further than what is presented in the DPEIR.

The preferred Alternative can not be identified until terrace mining as an alternative is developed fully in the DPEIR.

6.3 Comparative Environmental Superiority of Alternatives

4-13

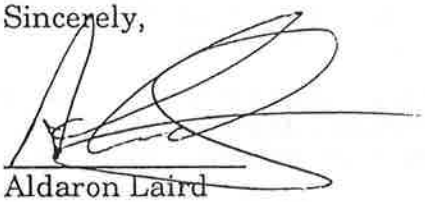
It is not clear if the DPEIR means the environmentally superior alterntive is Alternative 3 - the Moratorium Alternative, namely the status quo or No Project as defined under CEQA meaning no mining at the 10 sites.

4-14

The prefered is the Alternative 2 - Extraction Below Replenishment, this determineation can not be supported until Alternative 4 - Off-site Alternative is developed fully as stated earlier. Selecting a prefered alternative is not supportable based on the discussion of alternatives presented in the DPEIR.

In closing I would like to again commend the authors of the DPEIR they inherited a number of major obstacles to preparing an adequate document under CEQA.

Sincerely,



Aldaron Laird
Natural Resources Planner

DUN & MARTINEK
ATTORNEYS AT LAW
730 SEVENTH STREET, SUITE B
EUREKA, CALIFORNIA 95501
(707) 442-3791
FAX: (707) 442-9251

P.O. BOX 1266
EUREKA, CA 95502-1266

July 2, 1993

Comment Letter Number 5

TO: Board of Supervisors
Planning Director
FAX 445-7299
445-7446

RE: Comments to Draft Mad River EIR.

HUMBOLDT COUNTY PLANNING COMMISSION

The following general comments will be followed up with more specific comments as the final editing, site reviews, cross-section analyses, etc. are completed. The operators request that you leave open the time within which they may comment, in the interest of expediency and a more accurate and complete final EIR.

5-1

General comments regarding "degradation" and river elevations. The scientific studies, according to the operators, tend to overstate or "assume" the existence of "degradation" in the river's bed. Vic Guynup, for example, believes the studies underlying the EIR are "biased" towards under estimating recruitment and over estimating degradation. The studies also appear to over emphasize the role of sand and gravel extraction as the main cause of any degradation, while understating the other hydrological, natural, and man-made forces contributing to changes in river elevations and environment. For example: naturally occurring scour at even well designed bridge footings, poor design and placement of existing bridge footings, flood control projects, weirs and other projects associated with the hatchery and water district, variability of flows controlled by Ruth Dam, variability of quantity and duration of seasonal precipitation, and availability of upstream materials after earthquakes or droughts, etc. all may contribute to changes in the river.

Guynup site. Vic Guynup has stated that there has been no degradation of the streambed, thalweg, or water surface elevation at his site, since he first began mining the site just downstream of the hatchery. Vic has performed bank stabilization work and has previously channeled the river in cooperation with the Department of Fish and Game. None of that activity appears to have contributed to or caused any degradation at this site, which is at the uppermost end of the mined reach of the river.

Vic Guynup is concerned that the main river channel may shift away from the Blue Lake Bridge, across Hatchery Road at a point upstream of the bridge toward human habitations. According to Vic,

1

5-1 cont...

the river has a natural tendency to turn upstream of the present bridge site. Vic believes that his bank protection and channeling efforts at his bar and the work at the Emmerson Bar have helped to maintain the river in its present course beneath the Blue Lake Bridge.

According to Vic, during flood stage, if channeling is not done yearly, the river erodes the South bank. Since the 1964 flood over 4 acres have been lost. If this is allowed to continue the river will cut a new channel and return to its old course - requiring the construction of a new bridge for use during low water flows in the new channel. Vic reports that the former owner of the home at the junction of West End Road and Fish Hatchery Road lived there prior to the 1964 flood. After 1964, because of his concern the river would return to its old course, he had Mr. Guynup channel the river to maintain the present course of the river. Vic believes that if channeling is not done during normal years winter high water will hit the aggrading gravel and bounce into the north bank, putting pressure on the Blue Lake Bridge.

Blue Lake Bridge. Recorded elevations at the Blue Lake bridge, according to environmental consultant Bob Brown, do not support claims that there has been any significant degradation at that site. Any 1-2' variations may be accounted for by transitory seasonal changes in the riverbed, may be an artifact of choice of measurement locations, or may be accounted for by analysis of naturally occurring scour patterns associated with the bridge's footing construction and design.

5-2

Emmerson, Blue Lake, and Christie Bars. At the Emmerson, Blue Lake, and Christie Bars there has been significant recruitment during 1992-93 and operators indicate you can visually observe that the bars are at or near their historical elevations by observing the trees and banksides adjacent to the bars. These sites also had significant recruitment in the pits and trenches dug with the cooperation and under the supervision of the Department of Fish and Game. The trenches and pits all appear to be full or near full of sand and gravel.

5-3

Recruitment required to fill previous trenches and pits should be considered when calculating volumes transported and recruited during the last winter. Note that the filling of the trenches and pits from earlier mining operations (performed under the supervision of the Department of Fish and Game 1603 Agreement process) required a great deal of recruitment during the last winter. The volumes required to fill the trenches was, according to operators, at least 150,000 cubic yards throughout the lower Mad River. Adding this amount to estimated surface recruitment volumes indicates significant recruitment in excess of the historical highs and averages identified in the Draft EIR and appendices. Based upon such volume estimates and during discussions in early May, operators indicated that they believe there has been more than

5-3 cont...

300,000 cubic yards of recruitment in the entire lower Mad River during the last high flow season.

5-4

Railroad Bridge and adjacent site. The railroad bridge is downstream from Christie Bar and Simpson's lands, which appear to be at or near their historical elevations. A visual inspection of the railroad bridge revealed that the footing, under which a stick was apparently poked during pre-extraction inspections during 1992, was in fact constructed in parts or stages and was not a uniform structure. A shell of some 6" or more surrounds what appears to be the original footing. The original footing may, therefore, extend down further than the shell. The existence of the shell, the implied two-stage construction activity, and the unknown depth of the inner footing materials are not fully discussed in the EIR. Also, as of early to mid-May of this year, sand and gravel has recruited around the shell-footing such that no stick could be pushed under the shell's edge. And, it would appear that, according to an operator familiar with concrete and readimix products, the footing was not designed or installed properly, there was an attempt to repair or cosmetically conceal the original footing by placement of a shell, the repair or cosmetic shell is not functioning and is disintegrating, and the original concrete material and method of construction is not structurally appropriate or safe for the use to which it has been put.

The railroad bridge site was independently mined during the last decade and the EIR does not adequately describe the relative significance of that direct mining of the site, compared to the indirect impacts resulting from up and down river mining operations, on elevations at the bridge site. Hydrological factors, peculiar to that reach of the river wherein the bridge is placed, may also account for degradation at the site independent of headcutting, scour, or reduced recruitment due to other mining operations.

Note, both up river and down river from the railroad bridge there has been substantial recruitment of material during the last high flow season, which appears to be in amounts greater than those predicted in even the highest years in the EIR. Yet, this particular site has not received proportionately increased recruitment over last years elevations. Perhaps trenches have filled in at this site or were placed at inappropriate spots downstream of the bridge in previous years?

5-5

Essex Bar. Fred Bott alleges the river surface and streambed have not degraded significantly or at all since he first became involved with the site many years ago. Operators, like Mr. Bott, have provided anecdotal data regarding river elevations that does not appear to be consistent with some of the analyses and other data provided in the EIR. In this instance, Mr. Bott bases his observations on hard rock formations that abound at the site and which have maintained relatively constant shape. At those hard

5-5 cont...

rock formations the water level is approximately where it was many years ago during the various seasons.

Again, the recruitment volumes this last year appear to be consistent with the anecdotal reports of the operators which indicate "normal" year recruitment volumes are much higher than those described in the Draft EIR. This pattern of significant recruitment, after what the operators have referred to as a "normal year" (normal for recruitment, which they indicate occurs before waters reach a five year event level), appears to have occurred throughout the area described in the EIR. For example, Essex Bar (Mercer Fraser) appears to have fully recruited to some 4-5' over last years elevations.

5-6

Water District site. The operators had a number of concerns about the Water District site and allegations that the operators have harmed the site. These concerns often are expressed in the form of stories regarding the history of the site and operations there.

At least, the EIR should state that a more detailed study of the water district site and the causes, nature, and extent of any degradation at the wells and pulp mill intake should be pursued as part of the annual review process. Cooperation between the operators and the district in studying any problems at the well and intake sites should be encouraged and may be one of the most important products of the EIR.

5-7

299 Bridge and adjacent sites. The old 299 Bridge was built by Mercer Fraser in approximately 1943. According to Fred Bott, the bridge is constructed on top of pilings, placed at compaction standard depths. The pilings go many feet below the surface of the river. According to Fred Bott and Victor Guynup, since the time when the bridge was built many acres of land have been lost due to the influence of the river after it hits the bridge pier. Operators believe it was poor engineering to build a bridge that called for a pier in the curve of a river.

At the 299 bridge there has been recruitment both up and downstream of the bridge, yet the footings remain much as they appeared last year. Operators have indicated that the placement of the bridge in a narrowed reach of the river characterized by hard rock banks and bottom areas, given the particular nature of the design, contributed significantly to or caused the degradation discussed at this point in the river. Fred Bott stated that when a water pipe was put across the river, upstream of the bridge, they had to drill bedrock and had a very difficult time placing the pipe in the bottom of the river. The bedrock bottom, according to Mr. Bott, maintains the general river elevation in the vicinity of the bridge.

At the 299 Bridge site the operators believe the river's

5-7 cont...

bottom (thalweg elevation) was, at least temporarily, far lower than it is at present. There has been reference made to a redwood trunk buried deep beneath the 299 bridge footings (discovered when core samples were taken).[1] The location of a tree at what are believed to be below present sea level elevations may indicate an actual change in sea level or gross changes in surface levels relative to sea level due to the geologic movement of the immediate area or the entire watershed during earthquakes.[2] Could such gross changes in sea level or surface elevation relative to sea level account, in part, for movement of the mouth northward or changes in the river's streambed elevations and morphology?

5-8

Arcata Readimix and Redwood Empire Aggregates sites. These sites appear to suffer from a reduction of available material, compared with historic levels. Bill O'Neill reports there is some reduction of the water's surface elevation at the 299 Bridge, but the change in water elevation does not begin to approach the numerical level of degradation reported in the EIR (over 10'). The amount of the reduction is, according to Bill O'Neill, overstated in the EIR. He indicated that visual inspection of the 299 Bridge footings and adjacent banks shows that it would be almost impossible for the riverbed elevations to have been as high as those described in the EIR. Further visual inspection of the footings and analysis of historical photographs should be performed at this site. Anecdotal evidence may be available which will clarify what conditions prevailed in the riverbed at the time the bridge was built.

Mr. O'Neill attributes much of the reduction of bar material to weirs at the Water District site and upstream extraction removing sand and gravel before it moves down to the Arcata Readimix site. (There is no single clear description of the actual transport rates and impacts of upstream mining on downstream sites, or the impacts of downstream mining on upstream sites, in the Mad River study area.)

Some mining, according to Bill O'Neill, is presently possible, without impacting the 299 Bridge or water district sites. Further, Mr. O'Neill indicates that water surface elevations at hard rock formations near his main office site are presently at or near

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[1] Bob King, Redwood Empire Aggregates, has indicated that redwood trees would not have naturally grown down to the low water channels edge because of the heavy flows during the winter, which would have destroyed any such growth. He also noted that redwood trees could not stand, or there would be evidence of their having stood, on the high water banks of the river.

[2] During the recent earthquakes the bed of the ocean near Petrolia rose approximately 3' and the King Range peaks moved approximately 19", according to press reports at the time.

historic levels; further supporting the operators claims that alleged degradation has been overstated.

5-8 cont...

Channeling this year and in future years at the Arcata Readimix, Redwood Empire Aggregates, and other sites may be appropriate to control the stream channel, protect fisheries characteristics, and generally improve the lower riverine habitat. There is significant bankside erosion near the 299 Bridge which would be reduced or eliminated if the Arcata Readimix site were channeled to move the river towards the center of the present streambed. Fish migration and holding patterns in the lowest reaches of the extraction area may be encouraged by trenching at the sites.

101 Bridge. The 101 Bridge was also built by Mercer Fraser. It was built on steel pilings. According to Fred Bott, the streambed elevation is the same or higher than it was when the pilings and concrete bridge piers were installed. Fred Bott, Mercer Fraser, has offered to visit the river with the scientific team to show them where the river was at the time of construction.

Recruitment volumes during the 1992-93 rainy season and estimates of "normal" or average recruitment. Again, the recruitment volumes this last year appear to be consistent with the anecdotal reports of the operators which indicate "normal" year recruitment volumes are much higher than those described in the Draft EIR. This pattern of significant recruitment, after what the operators have referred to as a "normal year" (normal for recruitment, which they indicate occurs before waters reach a five year event level), appears to have occurred throughout the area described in the EIR. For example, Essex Bar (Mercer Fraser) appears to have fully recruited to some 4-5' over last years elevations.

5-9

The River Institute Report, attached to the EIR, discusses future studies that will be necessary to obtain an "accurate" estimate of recruitment, as versus a "crude" estimate based upon existing available data. The absence of scientific data sufficient to support an "accurate" estimate of recruitment should not serve as a justification for prohibiting gravel mining while future data is gathered. The EIR and regulatory processes require substantial, not perfect evidence, supporting approvals of projects. In this case, as discussed in the Kondolf report, river science is itself not exact or capable of "accurate" predictions of future river behavior.

Scientific formulas predicting total annual recruitment rates, cited by the River Institute, give projected annual recruitment volumes between 100,000 to 1,200,000 tons of recruitment per year - even though the data input into the different formulas is the same. This wide range of projected annual recruitment volumes, or high degree of variability between theoretical models, highlights

6

5-9 cont...

the limits of river science methodologies. The limits of scientific analysis and predictions of river behavior should be clearly addressed in the Final EIR and its findings. (See the Kondolf study description of variability and the limits of scientific prediction.)

5-10

River's mouth, estuary, and fishery. The movement of the mouth of the river and changes in the estuary were beyond the scope of this EIR. It is the operators' opinion that the estuary and mouth do not presently serve as holding areas for mature or juvenile salmonids, as they did in the past. Also, it should be noted that, in years past, the mouth of the river used to become blocked by beach sands and had to be manually opened to permit fish to enter the river. And, high waters during seasonal rains destroy eggs and flush young fish out of the lower river.

Those factors generally support the operators, who believe that little or no spawning occurs in the project area. There is some very, very limited attempted spawning caused by the hatchery fish remaining in areas where viable spawning is not possible due to seasonal river flows after the hatchery closes its doors to the migrating fish. There are also reports that the hatchery weirs interfere in upstream migration by native and hatchery bred returning adults. According to the operators and their consultants, fish primarily use the river channel in the study area for travel between the waters of the Pacific Ocean and the hatchery and upstream spawning and rearing areas. The EIR should include a recommendation that the state law be amended to reflect these facts by removing the Emmerson and Guynup sites from the Fish and Game Code section 1505 jurisdiction and relocating the lower spawning area boundary immediately below the Fish and Game hatchery.

5-11

5-12

Operators report that, prior to the dams being built on the upper river, the summer flows would all but dry up in much of the study area. Controlled release of water from Ruth Dam has changed this pattern. What, if any, impact on the fishery or mining sites results from the controlled flows? Could they cause or contribute to the movement of the river mouth to the north or a reduction of total sediment volume or composition in the riverbed?

5-13

Seals at the mouth and predatory birds are believed to contribute significantly to the death rate among both mature and juvenile fish during their life cycle in the Mad River watershed. I have been informed that canneries used to place nets across the Mad River, taking all or most of the fish going up river during the earlier 20th century.

All of those non-mining related factors should be analyzed or, at least, identified as having an impact on the fishery in order to accurately assess causes of declines in fish runs. This is particularly important, since there is no significant evidence that

7

5-13 cont...

the sand and gravel mining has in fact caused a diminished salmon or steelhead run. Where there is no such impact, or such impact is highly speculative, the EIR should so report.

5-14

Plant and other animal life. The need for or desirability of successive stages of vegetation, often apparently including non-native species of annual and perennial plant materials, is not adequately explained in the EIR. The possibility of maintaining early, middle, and later staged materials (if these stages are natural throughout the Mad River project area) needs to be addressed in the light of the need by the community for sand and gravel resources and any potential increase in risk of flood damage from mature vegetation in the stream channel.[3] There are sections of the river which are not subject to mining permits and approvals which might be maintained in a later stage, while mined areas might be maintained as areas where early stage characteristics prevail.

5-15

Navigation and summer bridges. Recreational and other uses are discussed, but I do not recall an adequate description of the fact that railroad car/summer bridges cannot be raised to a level where they will permit navigation by boats beneath them. First, the river is neither wide enough or deep enough at many points during the low flow periods to permit easy navigation by row boats, drift boats, canoes, etc. The EIR should address the fact that bridges may impact what little recreational boating would occur, but that such boating should not provide an excuse for rendering operations impossible by the imposition of impractical bridge height requirements.

5-16

Economic significance of mining and the public trust. One of the protected uses that is to be considered when managing an area subject to an alleged public trust[4] is the commercial or economic use of the resource at issue. In this case, the public obtains essential products and services from mining operations in the Mad River streambed. There is no economical alternative to mining the riverbed. Even if mining operations caused significant adverse impacts on the environment the County could approve operations based upon overriding economic significance of those mining

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[3] There is no significant discussion of the previous study by the Army Corps of Engineers identifying the Mad River as an imminent flood hazard and calling for immediate steps to reduce or eliminate the risk of flood damage in the project area.

[4] I wish to point out that the inclusion of streambeds, that are otherwise outside of area subject to tidal influences, in the public trust domain is not an historically established principle of law. See, for example, the dissent in State of California v. Superior Court (Lyon) 29 Cal.3d 210, opposing the inclusion of non-tidal streambeds, between the ordinary low water and high water marks, within the domain subject to a public trust.

8

operations for the whole community.

5-17 As an aside, to my mind the real project at issue in reviewing and approving this EIR is the preservation of the community and its way of life while also protecting the environment and other projects within the lower reach of the Mad River. Such a purpose is consistent with the public trust responsibilities of the County as lead agency under the various state and federal environmental quality regulatory schemes. These issues need to be emphasized in the final EIR.

5-18 Increasing minimal extraction amounts, flexibility. The EIR is encouraging, but the minimal amounts of prescribed extraction in the Draft EIR (125,000 to 150,000 cubic yards per year) should be increased as further evidence confirms natural recruitment in significant amounts above those hypothesized in the Draft EIR (the estimates in the EIR, for example, do not appear to include recruitment from sources downriver of the gauging station, such as the North fork and other streams below the hatchery). The EIR must provide a flexible mechanism for increasing amounts of extraction when circumstances warrant. This mechanism may be most effective if it is part of the annual review process required by SMARA; combining SMARA, Fish and Game 1603, and EIR suggested reviews into one annual process.

5-19 Moratorium on further permits and approvals. Because of the costs associated with the development of this EIR, it is unfair to permit or authorize operations at any sites or by any parties not included in the present draft EIR without first obtaining a proportional payment of the EIR costs. Any such amount should be held in the mining trust fund and should be pro-rata redistributed to the operators based on the amount of their previous contributions. Any new or further permits or approvals of mining operations, other than those identified in the EIR, should be subject to a condition that they be performed in a manner that will not adversely impact or reduce the volumes available to the operations identified in the EIR.

Based upon figures in the EIR, Planning Department staff have tended to discuss total extraction amounts as being around 817,000 cubic yards each year. The 800,00 cubic yard figure is misleading, it is based on the "up to" amounts in reclamation plans, permits and vested rights determinations. The "up to" volumes are generally included in permits or vested rights determinations to take into account historical maximum extraction amounts not averages. Further, the 800,000 plus number is both inaccurate and very misleading because it is obtained by adding the maximum amounts addressed in reclamation plans to other permit "up to" amounts. This is an extremely inaccurate method of describing actual or potential extraction because reclamation plans do not serve as entitlements to operate. Note, the table on page 5 of the River Institute Report shows that during the last 5 years an

5-19 cont...

average of 280,000 cubic yards was actually extracted - which, the operators believe, is consistent with or greater than historical average annual extraction amounts.

5-20

Payment for river management plans, fees and reporting by "exempt" operations. The cost of the river management plans should be paid for by an annual assessment of a cubic yard extracted amount (for operations over a specified amount, e.g. 500 cubic yards at any one site), including payments by larger exempt operations. Operations that are for any reason exempt from SMARA or County surface mining permit processes should be required to report extraction methods, amounts, and locations in order to eventually obtain accurate sediment budgets and inventories, valid transport and recruitment data, and economic analyses of the need for and use of the river resource. Such reports may be based on fair estimates of total extraction, to reduce unnecessary bookkeeping. A fixed fee or per yard amount should be assessed on smaller exempt operations to help pay the cost of County lead agency review of the river. The Water District, CalTrans, Department of Fish and Game, and other agencies should assist in performing cross-sections, aerial overflights,[5] water quality analyses, fish inventories, vegetation studies, etc. in the interest of reducing the costs to the operators and the County.

5-21

Conclusion. In concluding, what we need is a fair process that involves both operators and qualified engineers from the County in an annual review of river conditions. SMARA requires annual reviews, in any case, as does the Department of Fish and Game 1603 Agreement process. What we do not need are a bunch of bureaucratic rules, fixed operating conditions, and speculative proposals for resource management that confound common sense and sound business management practices.

The annual review process would undoubtedly end up being very similar to the present scientific committee reviews and may be procedurally similar to the review conditions imposed on the Redwood Empire Aggregates reclamation plans and vested rights approvals from 1992. The annual review process provides the County an independent basis for approving annual extraction amounts and methods and would coincide with the Department of Fish and Game reviews under the 1603 Agreement program.

The purpose of the review process would be to provide efficient, accurate summaries of the previous year extraction, pre-

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[5] Operators and their agents have indicated that aerial photos of the entire length of the river may provide an adequate basis for developing cross-sections, monitoring river morphology, and analyzing plant life in the streambed area. If that is the case, aerial photos may be a cheaper alternative to multiple field surveys to develop cross-sections.

5-21 cont...

season analysis and operation proposals, and post-season data and review of completed operations. Our goal, in other words, is to exercise common sense in developing scientifically grounded river management practices. In the long run, the operators believe, the scientific analyses will confirm, in the main, that the previous operations were relatively safe for the environment and the fish.

Very truly yours,

DUN & MARTINEK

WOD

William O. Davis

11

TOTAL P.12

May 17 '93

Hum. Planning Dept.
Eureka, CA.

Comment Letter Number 6

HUNNER
BOX 1011
ARCATA, CA 95521

MS. Martel-Accetta, et al —

6-1

Regarding Mad River gravel extraction and as a resident of West End Road, across river from Site #4, I would deem 60-70 dBA, in this residential low density area, clearly unacceptable rather than the listed 70-80 dBA range.

Prevailing north winds in summer deliver hyper ambient noise levels in considerable excess of 52 dBA, as stated. This is poorly classified as "less than significant" and has lead to alteration of planned building sites and loose property value.

6-2

Further, I regard very early and late evening (5:30-8:30 AM and 6:30-9:30 PM) weekend gravel bar scraping an egregious affront to my pastoral property rights; regardless of a "compressed extraction season," as mentioned in EIR. Assuming 12 hour days for extraction (during a 2 month period) a weekend time reduction of 2 hours per saturday and sunday would represent a 5% overall reduction of allowed extraction hours - a small price to pay for peace in the County and one that could be made up to the company by extending the extraction period to 2.1 months.

60 days M-F 7-7 = 12 hrs. x 40 = 480 hrs.
S-S 8:30-6:30 = 10 hrs. x 16 = 160 hrs. vs. 192 hrs.
640 vs. 672 = 5%

Regards - Bruce Hunner

P.S. keep up the good work!

DAVID S. KRUEGER
Attorney

P.O. Box 649 • Arcata, CA 95521 • (707) ~~839-5971~~ 442-9598

Comment Letter Number 7

July 2, 1993

Humboldt County Planni
Planning Division
3015 H Street
Eureka, CA 95501

Comments on Draft Program EIR on Gravel Removal from Lower Mad River

7-1

Thank you for the opportunity to participate in the planning for the management of gravel mining on the Mad River. This PEIR is an important first step in establishing coherent planning for the management of the river. The process is difficult and the subject matter is complex. I appreciate the time and effort required to address these issues. The Mad River is worth it.

I am writing to express my concerns regarding the Draft PEIR. Time prevents me from covering all of the concerns I have. Consequently, I have not found the time to point out the parts of the Draft PEIR that are well done. Despite the negative tone of the bulk of my comments, I recognize that much hard work has gone into the preparation of the document and that hard work has resulted in much of the document and appendices being very well done.

The annual review process is an important innovation that I think will provide a model for other plans to follow. Because rivers are complex and dynamic, one-shot planning cannot address the consequences of in-stream mining. Being new and complex, there will be bugs to be worked out of the annual review process. I am glad you have accepted the challenge of pioneering this procedure. I am concerned that you have not more completely described the annual review process. If it is well designed and executed, I am optimistic that it will make an important contribution to the management of the Mad River.

7-2

There are, however, several serious flaws in the Draft PEIR. It fails to address issues of the most (and least) appropriate locations for gravel mining, the long-term impacts on vegetation at the mining sites, and mitigations for impacts to the public trust easement along the river. The Draft erroneously uses the present condition of the river for

7-2 cont...

determining the impacts of mining to be mitigated when this planning should have applied to these operations twenty years ago. Visual impacts of mining are essentially ignored (despite numerous pages of text on the subject) and consequently only one insignificant mitigation is identified. Generally, site-specific mitigations tend to be missing (to be provided in a later document perhaps). And unspecified issues are to be addressed in an Aggregate Resource Management Plan which is to serve an unidentified purpose.

7-3

In terms of substantive issues, the two categories that most concern me relate to river morphology and riparian habitat (forest and scrub in particular). River morphology issues receive considerable substantive attention in the Draft PEIR. Vegetation issues are largely ignored; apparently because of inappropriate focus in the analysis of vegetation issues. Vegetation is central to habitat and aesthetic issues and plays a role in river morphology and water temperature issues. There are unanalyzed opportunities to mitigate for aesthetic and habitat impacts by requiring dedications of areas to be planted to accelerate the development of riparian forest and scrub. There are also unanalyzed opportunities to provide access and river recreation enhancements to mitigate impacts to recreational river use.

7-4

Though it is not a subject of the PEIR, implementation of the planning reflected in the PEIR deserves comment. Unfortunately, many opportunities for applying planning have been missed, and this planning is taking place only after the damage from unregulated and largely illegal mining has become severe. Use permits and reclamation plans have been issued without the benefit of any significant planning. The County has gone to extraordinary lengths to make findings of vested rights for operations, potentially foreclosing the planning associated with the issuance of use permits. Though potentially difficult, many of these errors can be remedied. However, it will take a concerted effort to implement plans established at such a late date. Without implementation and enforcement, the best planning is a waste of time. When this planning process is complete, the hard work that went into its creation must continue long enough to put the planning into effect. I am hopeful that the process is beginning.

SCOPE OF PEIR

7-5

It is difficult to identify the project the PEIR applies to. The project is described as the extraction of sand and gravel from 10 sites along the lower Mad River. However, the lack of site-specific mitigations and the fact that the County considers these operations to mostly be permitted or vested indicate that these operations are not the "project." Elsewhere the PEIR claims it applies to the ARMP. However, the ARMP is deferred to a later date and is not described. At the scoping meeting we were informed that the PEIR

would only apply to reclamation planning (a scope that is obviously, and appropriately, exceeded).

It appears that the PEIR is simply a compilation of environmental impacts by existing gravel operations on the lower Mad River and a list of mitigations that are vague because they are out of the context of a specific project. Many of the concerns expressed in this letter appear to be the result of the lack of focus resulting from the lack of a specific project. The PEIR should have been prepared in the context of the ARMP (guessing that the ARMP will be a plan for managing mining on the lower Mad River) or a River Management Plan. This Draft PEIR would be best used by incorporating it into a draft ARMP EIR or a draft River management plan EIR.

7-5 cont...

There must be a program for the PEIR to apply to. The existing operations do not represent a program. Development of a plan, such as the ARMP may be, could provide the necessary context. Adoption of regulations for gravel mining operations could also be the program or project. Mere analysis of existing operations is not analysis of a "program."

Unless this issue is dealt with, the PEIR is an interesting and important discussion without a context. The CEQA requirement of discussion of alternatives cannot be met without a better defined project to give the alternatives some meaning. The document needs to discuss what the agencies are considering doing.

LOCATION OF MINING

7-6

The Draft PEIR does not address which sites in the project area are most appropriate for gravel mining and which are inappropriate. Locations which are the most sensitive or the best candidate locations for restoration are the least appropriate for mining. Conversely, the sites which are the least sensitive and the poorest candidate locations for restoration are the most appropriate sites for mining. There is no analysis of comparative site advantages in the Draft PEIR.

BASELINE FOR IMPACTS

7-7

The Draft PEIR inappropriately uses the existing degraded condition of the Mad River as the baseline against which impacts are measured. For example, when analyzing impacts to aesthetics and vegetation, the Draft looks at impacts on the present vegetation and visual quality at the mining sites rather than the vegetation and appearance that existed prior to mining or at the time CEQA was passed.

7-7 cont...

Many of the operations constituting the "project" were illegally initiated or expanded after the advent of CEQA. Vegetation was removed and suppressed and buildings and stockpiles established. These impacts must be included in the PEIR analysis. Failure to require mitigation of impacts that have already occurred would reward the least responsible operators. To use the status quo as the baseline would mean the more destructive and wanton an operator's prior operation, the less mitigation they will be required to provide.

SITE SPECIFIC MITIGATIONS (Scope of PEIR?)

7-8

- - - The Draft PEIR generally lacks site-specific mitigations. If the PEIR related to planning proposals (such as a broad management plan or proposed regulations) rather than particular project proposals, the site specific details could be left to subsequent EIRs relating to specific projects for which the analysis could be tiered to the PEIR. However, specific operations are identified as the "project" in this PEIR. With that focus, mitigations specific to those operations must be identified.

AESTHETICS

7-9

Gravel mining operations are god-awful ugly. Many of the devegetated river bars would, if left alone, develop attractive riparian forests over time. Despite these obvious impacts, the Draft PEIR comes to the extraordinary conclusion that the visual impact of these operations is (with one exception) insignificant. (Pages 103 to 106)

Canoeing on the Mad River in the project area (my principal recreational use of the project area) is depressing. It is not just the gravel industry. Mining's impact is cumulative with the impacts from transportation, industry, flood control, and other development that has occurred with little consideration of the impacts on the appearance or condition of the Mad River. It is not just the appearance of structures and development that mars the appearance of the river. The repeated and ongoing interruption and suppression of the development of riparian forest leaves the river with its most serious visual impacts. Correction of the mismanagement and abuse of this potentially beautiful river must begin with this PEIR. Gravel mining did not cause all, or even most, of the aesthetic problems on the Mad River. That does not, however justify ignoring mining's impacts or the operator's ability to mitigate the impact of their operations.

Processing areas and many haul roads can be screened from the river, public roads and residences by planting natural appearing forest buffers. If these buffers are thoughtfully designed, they can also contribute to the objective of mitigating for destruction of emerging forest areas and suppression of the natural development of such habitat. At

some operations such buffers are developing naturally. However many views that could be screened are not.

Some adverse impacts to views of processing areas and haul roads and areas where succession of vegetation is prevented by repeated mining cannot be mitigated by screening. These impacts can be mitigated by dedicating another degraded area to restoration of riparian forest or scrub.

The Draft PEIR apparently misses the significance of adverse visual impacts for two reasons. The status quo is used as the benchmark (page 103), and visual impacts are only recognized to the extent they differ from the surrounding setting (pages 102-103; Appendix E, page 6).

The status quo cannot be the benchmark for impacts. (See above.) If these operations are the "project," it is the impacts of these operations that must be addressed.

7-9 cont...

The methodology used in Section 5.9 is entirely inappropriate. The Draft EIR adopts the "Visual Management System" which was developed by the Forest Service for analyzing the impacts of logging on visual quality. This methodology uses contrast to the surrounding landscape as the benchmark for determining the significance of the visual impact of proposed logging. This methodology only works where the landscape surrounding the project is considered a desirable condition. In a forest setting, the natural landscape is an appropriate baseline from which to measure contrast. The same analysis does not work in the setting of the lower Mad River. Use of this inappropriate methodology has the effect of concluding an ugly operation is not a significant visual impact if there are other ugly things in the area. By this methodology, elimination of an urban park to put up buildings would have an insignificant visual effect (or perhaps would be considered a favorable effect because it reduces the contrast in the viewshed). This methodology also ignores cumulative effects.

Ugly is ugly. If something ugly is highly visible, it has a significant visual effect. Attractive is attractive. Riparian forests are attractive. Preventing riparian forests from developing has a significant visual effect. Using this common sense approach prevents absurd conclusions such as that the appearance of Eureka Sand and Gravel's processing and stockpile yard from Highway 299 is insignificant. (Pages 104-105.)

Visual impacts must be acknowledged and mitigated. Limiting mitigation of visual impacts to smoothing graded slopes (page 106) is blatantly unacceptable.

MITIGATION OF IMPACTS TO VEGETATION

7-10

The section on impacts and mitigations relative to vegetation (section 5.7) begins with a fine description of river-side vegetation and its succession comprised of five pages of text and a table. However, this good start is not followed by any significant discussion of impacts of mining and analysis of mitigations is largely ignored or postponed (depending on how you interpret "mitigation measure H2O Qlty-3a.")

7-11

The general discussion of vegetation should include a discussion of the pre-settlement condition of the vegetation on the Mad River. It also should discuss projections of successional development beyond those that have occurred through the present if the area were to remain undisturbed or were actively restored, including a discussion of factors making restoration of the pre-settlement conditions along the river difficult. This discussion also does not discuss in sufficient detail the importance of riparian vegetation in maintaining channel stability, encouraging a narrower/deeper river channel, providing detritus for aquatic organisms and contributing to controlling water temperature.

As with other sections of the Draft PEIR, this section erroneously uses the status quo as the baseline for its analysis. This failure aggravates the failure to address cumulative impacts of destruction and suppression of riparian vegetation. The scope of the loss of riparian vegetation due to all causes must be discussed.

7-12

There is no significant discussion of the impacts of mining on vegetation. The oversight is inexplicable in that the consultant's report (Appendix H) includes a discussion of impacts.

7-13

Under the part of the vegetation section entitled "Impact Statements and Mitigation Measures", there is no discussion of impacts and generally only symbolic discussion of mitigations. For each site, under the heading "Impact", there is a brief description of the vegetation on the site and no mention of impacts. Only three of the twelve sites analyzed include any discussion of potential mitigation. None of the discussed mitigation is recommended in the following boilerplate "Mitigation Measure" which proposes annual review as the only mitigation. Annual review is a deferral of addressing an issue. It is not a mitigation. Annual review is merely a promise that decisions about mitigation will be made some time in the future.

7-14

The consultant's report contains many recommended mitigation measures. The failure to address these mitigations cannot be justified.

7-15 The mining operations must mitigate for historic destruction of vegetation subsequent to CEQA, for any proposed destruction and for the suppression of vegetation. This mitigation should take the form of dedication of areas for vegetation restoration and restoration work to accelerate the development of late successional stages of riparian forest. This can occur on or off the locations where the operations are occurring. (As mining operations are less permanent than the mitigations will need to be, it might be valuable to set up a system of transferrable development rights based on dedications of restored habitat to permanent protection.)

7-16 - - - The Draft PEIR proposes as a mitigation that the HCPD and CDFG develop a revegetation plan. This is not a mitigation. This is a deferral of addressing the issue. Such a deferral is appropriate only if the PEIR is not considered to be sufficient for addressing vegetation issues. An appropriate interim solution may be to propose quantitative revegetation requirements when issuing permits (such as requiring the operator to dedicate and restore, or pay for dedication and restoration of, a certain number of acres of a certain type of vegetation to meet certain objectives) to be implemented consistent with a revegetation plan that will be completed at a later date.

QUANTITY OF GRAVEL TO BE MINED

7-17 There is inadequate discussion of the need for replenishment of gravel from past excessive extraction levels. Comparisons of alternatives 1 and 2 discuss extraction rates in terms of the risks of miscalculation. There is also the issue of replenishment of gravel in an already depleted system that must be addressed.

7-18 Alternatives 1 and 2 do not represent a sufficient range of alternatives to permit consideration of reasonable alternatives. Alternatives 1 and 2 are the only alternatives that will plausibly be considered for adoption, and Alternative 1 really is not viable given the acknowledged risks it entails. There must be a range (at least two) of alternatives that propose extraction below replenishment. Only that way can the relative impacts be analyzed. The experts recommend mining at a level (100,000 cubic yards) 25,000 cubic yards below the "recommended" annual extraction level in the Draft (page 39). The PEIR requires another alternative with an extraction below the "recommended" level to allow comparison of the consequences of the initial extraction level that will be in place during the critical early years prior to monitoring occurring and before repairs to structures can take place.

CUMULATIVE EFFECTS

7-19

Though the PEIR is touted as having the purpose of evaluating the cumulative effects of gravel extraction on the natural resources of the Mad River (page 2), the Draft PEIR has very little discussion of how impacts accumulate other than on the issue of the quantity of gravel mined.

COMPARISON OF IMPACTS OF THE ALTERNATIVES

7-20

Given the limited alternatives addressed (only varying the quantity of gravel removed or the source of the gravel, and ignoring differing levels of mitigation for most other impacts) brief statements suffice to compare the relative environmental impacts of the alternatives relative to many issues. However, where the impacts of the different alternatives significantly differ, the sentence or two of analysis in the Draft PEIR is inadequate.

7-21

The PEIR is supposed to aid in the difficult and controversial task of balancing the competing interests affected by gravel mining on the Mad River. The section comparing the impacts of the alternatives is supposed to be the part of the PEIR that brings those difficult issues into focus and lays out the difficult choices that must be addressed. That this section completely lacks any indication of the considerable controversy that surrounds planning for gravel mining on this river indicates either that this section misses the substance of the controversy or the preceding sections failed to identify the right facts and issues. I believe a combination of the two accounts for this section failing to provide any assistance in resolving important issues.

Please feel free to call me to discuss addressing the concerns expressed in this letter or any other issues on which I may be of assistance.

Sincerely,

David S. Kruger

HUMBOLDT BAY MUNICIPAL WATER DISTRICT
828 SEVENTH STREET. P. O. BOX 95 - EUREKA. CALIFORNIA 955
OFFICE 707-443-5018 ESSEX 707-822-2918
FAX 707 - 443-5

Comment Letter Number 8

June 11, 1993

Sidnie Olson
County of Humboldt Planning Department
3015 H Street
Eureka,Ca 95501

Dear Ms. Olson:

The purpose of this letter is to comment on the "PEIR On Gravel Removal From The Lower Mad River."

In our opinion, the PEIR presents a reasonable assessment of the nature of the lower Mad River; further, it provides a good framework upon which to develop the proposed Aggregate Resource Management Plan. The report's acknowledgement of the dynamic nature of the river; and, its explanation of the relationship of gravel extraction to the workings of the river system are vital as the community strives to come to reasonable conclusions about the future of gravel operations in the lower Mad River.

Outlined herewith are HBMWD's comments and suggestions about the Mad River PEIR.

8-1 1. Two sections of the report (p.1 par.1 and p.30 par.2 of Conclusion) state that the purpose of the report and its proposed mitigation measures is to protect the natural resources and banks of the Mad River. It should also be said that the protection and preservation of millions of dollars of public facilities is a goal of the EIR/mitigation process.

8-2 2. Mitigation measure Morph 1-a (Extraction below replenishment) would seem to prevent further erosion of the streambed if the measure is implemented on a site by site prescription basis, as was the case in 1992. We agree with the PEIR conclusion that this measure may still leave significant effects, especially if replenishment rate calculations, extraction rates, and extraction prescriptions are not closely monitored and adjusted each year.

8-3

3. Mitigation measure Morph 1-b (Reconstruct/retrofit structures) must be more fully explained in terms of economic impact. The cost to rebuild bridges, roads, water or sewer systems, and railroad tracks, all impacted by a steadily eroding streambed, amounts to many millions of dollars.

For example, just to replace HBMWD's direct industrial diversion station has been estimated to cost at least $5 million in 1993 dollars. Costs to replace the municipal system have not been calculated specifically, but could easily be expected to exceed $10 to $15 million in 1993 dollars, exclusive of the enormous costs and impacts of providing domestic water supply while replacement efforts are under way.

8-4

4. The Summary of Environmental Effects (p.11) should provide more detail in PU&S 12 -HBMWD Reach. We would suggest a PU&S 12-a to read "HBMWD five municipal Ranney wells." We also suggest that a PU&S 12-b be added to read "HBMWD industrial surface diversion." We feel that this clarification will help reviewers of the PEIR more readily grasp the PU&S impacts - especially those who will likely review only summary portions of the document.

8-5

5. The Public Utilities and Structures (PU&S) impacts detail on the HBMWD reach (p.143) should be clarified to show that HBMWD has five Ranney Wells and one surface diversion structure. The current wording implies the surface diversion is also a Ranney Well.

8-6

6. A portion of the Hydrology section (p.43) should be revised to properly reflect the release requirements below Essex. We suggest the following: "Ruth reservoir has a capacity of 48,030 acre feet. At Ruth Dam, the required minimum flow released to the river is 5 cfs. Below Essex, the HBMWD must maintain the natural flow or the flows outlined below - whichever is less." The discharge table is correct.

We agree fully with the finding that Ruth Reservoir does not exert a significant impact on the sediment transport of the river. Our own findings indicate very little sedimentation of the lake has occurred since its construction.

8-7

7. The HBMWD Gorge narrative (p.54) should incorporate the following minor clarifications: a) " In 1962, the HBMWD installed three Ranney-type wells in this reach. Two additional Ranney wells were installed in 1965 as part of an overall system expansion."; b) The well depth penetration is "... to depths of 90 feet and have perforated radial intake pipes located 50 to 80 feet below the riverbed."

8-8

8. The Blue Lake Valley narrative (p.49) should be revised to read "... one of their initial studies preliminarily concludes that - with proper river management, including conjunctive use - this aquifer might supply up to 20 MGD."

Thank you for the opportunity to comment on what we feel is an excellent bench mark document. Please keep us advised as this important issue continues to unfold.

Sincerely,

Royal E. McCarthy
President, Board of Directors

REM/faa

RICHARD S. PLATZ
ATTORNEY AT LAW
241 RAILROAD AVENUE
POST OFFICE BOX 797
BLUE LAKE, CALIFORNIA 95525
(707) 668-5697

Comment Letter Number 9

June 30, 1993

Sidnie L. Olson
Humboldt County Planning and
Building Department
3015 H Street
Eureka, CA 95501-4484

Re: Program Environmental Impact Report
Gravel Removal from the lower Mad River
April 19, 1993 Draft

Attention: Mr. Olson

I am the City Attorney for the City of Blue Lake. The Blue Lake City Council at an adjourned meeting on June 29, 1993, following a review of recommendations by the Blue Lake Planning Commission, by motion duly passed and adopted authorized and instructed me to submit comments on the Program Environmental Impact Report dated April, 1993 on gravel removal in the lower Mad River. The comments of the City of Blue Lake are as follows:

9-1

1. The City feels that the following mitigation measures are important and should be included as part of the project:

A. Morph-1a. Extraction volume shall be below the annual replenishment rate as determined by the annual review, which is described in mitigation measure H2OQLTY-3a.

B. Noise-9a. All operational equipment used on the gravel bar shall have double mufflers installed to reduce noise impacts. This will be monitored by Cal-OSHA.

C. Noise-9b. All gravel bar operations shall be limited to the hours of 9:00 a.m. to 5:00 p.m., Monday through Friday. This will reduce conflicts from early morning, and late evening fishing enthusiasts, and weekend recreational use. This measure will be monitored by the HCPD.

2. The City feels that the following issues have not been adequately addressed in the PEIR:

9-2

A. With respect to mitigation measure Morph-1b, how will the reconstruction and retrofitting of bridge supports, pipelines, and other structures as necessary to bring them up to applicable safety, engineering, and building codes by the year 1998 be funded? Does the County intend to impose a tax on gravel extraction which will produce sufficient revenue for the various agencies involved to accomplish the reconstruction or retrofitting? If so, how will the tax be accomplished, and what will its impact be on the economic viability of gravel extraction?

9-3

B. Has the depth of the gravel bed at the extraction sites been studied or measured?

9-4

3. The City feels that the following proposed mitigation measures are not feasible at the present time and more feasible mitigation measures should be substituted in their place:

A. Traffic 1-a. The City of Blue Lake shall develop a road maintenance fund. All known industrial traffic generators shall contribute to the fund. To avoid the maintenance fund, some industrial operators may choose to use West End Road instead. Rerouting traffic over West End Road could result in additional impact that cannot reasonably be ascertained at this time.

Comment. The City does not have the power to require all industrial traffic generators to contribute to a road maintenance fund. If the County has the power and means to establish such a fund, the particulars should be set out specifically in the PEIR. Otherwise, this mitigation measure should not be relied upon.

9-5

B. Traffic 1-c. Pursuant to the City of Blue Lake 1986 General Plan Circulation Element, the City of Blue Lake should develop an alternate truck route by the year 1998.

Comment. The City does not now have, and will not have in the foreseeable future, the means with which to develop such an alternative truck route. The County should not rely upon the development of such an alternative truck route by the City as a mitigation measure in the County's consideration of this project.

9-6

4. The City feels that the following mitigation measure is important and should be included as a part of the project:

Blue Lake No. 1. As a condition of all gravel extraction permits, gravel operators shall be required to advise all drivers of large trucks to drive through the City of Blue Lake at a reduced speed and in such a manner as to minimize the noise created by their vehicles.

9-6 cont...

Comment. Many in the City feel that the large gravel trucks passing through the City are the major source of noise pollution in the City. Reminding the truck drivers at the source of loading gravel may help to decrease the negative impacts on the City.

Respectfully submitted,

Richard S. Platz,
City Attorney
City of Blue Lake

RSP/js
cc: Karen Nessler, City Clerk
Bob Brown, Blue Lake Planning Commission

NORTH COAST RAILROAD AUTHORITY

Comment Letter Number 10

June 14, 1993

Ms. Sidnie L. Olson, Senior Planner
Planning Department
3015 H Street
Eureka, CA 95501

Dear Ms. Olson:

The purpose of this letter is to comment on the PEIR response regarding the gravel removal from the lower Mad River.

10-1 The North Coast Railroad is concerned about the degradation of the Mad River Riverbed due to excessive gravel extraction. One of the Railroad's major bridges spans the Mad River. Two of this bridge's main support columns have been severely impacted due to this excessive extraction of gravel from the river. The loss of this bridge would be devastating to the railroad and their customers. The loss of this bridge would result in a further loss of public service access to the Blue Lake region. The main water supply line and other communicative cabling has an easement over this bridge.

10-2 Further erosion of this stream bed should not be allowed to go below a specific level. Measures should be implemented on a site by site basis to maintain the extraction rates. It would cost in excess of 5 million in 1993 dollars to replace this bridge.

Sincerely,

Stephen F. Crook
Acting Executive Director NCRA

cc: NCRA Board Members
Mr. Gene Wahl

Post Office Box 8044, Eureka, CA 95502 Phone: (707) 441-1625 Fax: (707) 441-1324

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

June 11, 1993

Mr. Tom Conlon
Humboldt County Planning Division
3015 "H" Street
Eureka, California 95501-4484

Comment Letter Number 11

Dear Mr. Conlon:

Mad River Program Environmental Impact Report on Gravel Removal from the Lower Mad River (PEIR)
SCH 92083049, Humboldt County (County)

The Department of Fish and Game (Department) has reviewed the PEIR on Gravel Removal from the Lower Mad River.

The PEIR evaluates the extraction of 817,000 cubic yards of sand and gravel from 10 sites along the lower Mad River, from the former Sweasey Dam site downstream to Hammond Trail Bridge. Two of the sites owned by Simpson Timber Company are not currently authorized to remove gravel and were listed only as potential future sites. The proposed extraction volume from these two sites is 65,000 cubic yards. In addition, Eureka Sand and Gravel has an application on file for 100,000 cubic yards of gravel in addition to its current entitlement of 50,000 cubic yards.

We find that the PEIR has sufficiently covered and analyzed environmental impacts resulting from this project. We believe, however, that it is deficient in that it does not include a mechanism for transforming the information generated by the PEIR findings and recommendations into a functional river management plan:

11-1

1. There are no specific information and procedures, guidelines or time frame required for annual review by the lead agency.

2. The document fails to state how the preferred alternative of extraction below recruitment (a limit of 125,000 cubic yards per year) will be allocated among five permitted operators, Humboldt County Public Works Department and possibly Zabel Trucking and Simpson Timber Company.

11-2

3. The PEIR fails to identify site-specific minimum thalweg elevations (red lines) below which the riverbed should not be allowed to degrade (requiring cessation of extraction) and, similarly, fails to identify the criteria under which extraction could resume.

11-3

4. The PEIR assumes the Department will conduct extensive monitoring as mitigation for this project.

11-4

According to the PEIR, the estimated average long term (1962-1992) rate of bedload recruitment to the lower Mad River is 150,000 cubic yards annually, with a rate of 200,000 cubic yards being the maximum "probable" average annual rate. The PEIR concludes that, if extraction is expanded to permitted or proposed levels or even continued at recent levels, there can be little control of adverse channel changes induced by gravel extraction. Any new permits will induce additional environmental impacts and further reduce the gravel volume each of the five permitted commercial operations receive.

The PEIR identifies existing and potential significant environmental impacts resulting from the extraction of sand and gravel from the Mad River. The recommended alternative of extraction below recruitment will ensure conformance with the established goals and policies of local coastal and general plans. Without mitigation, the project does not conform with goals and policies of the County general plan as expressed in the framework plan portion of that plan.

11-5

The PEIR concludes that through annual review of gravel extraction and recruitment and changes in channel morphology, the County will be able to establish appropriate quantities, locations and methods of extraction. We concur that annual review is necessary and that the lead agency should guide the industry and trustee agencies through this difficult process. However, we believe the document is deficient because it does not include specific procedures and protocols for annual review and subsequent action by the lead agency. We do not believe that referencing annual review and mitigation is adequate. A concise plan with a specified time frame, to be implemented and reviewed by a qualified professional geologist/hydrologist, is essential if the proposed mitigation is to be effective.

We are further concerned about delays in implementing controls of gravel operations on the Mad River. The environmental impact report (EIR) for the lower Eel River was certified in 1992. The basis for mitigating potential resource impacts was annual review and monitoring. A river management plan was recommended as mitigation for this project, however, that document did not include a specific schedule or procedure for developing annual review and it has yet to be developed and implemented.

11-6

We do not believe that the Mad River can tolerate further delays in implementing reasonable resource planning and management. A clear and concise plan for annual monitoring, review and subsequent extraction plan should be developed and included in the PEIR prior to certification.

The Department recommends that the County, as a lead agency, contract for or conduct all monitoring on the Mad River including annual aerial flights and preproject and postproject channel monitoring. The County and/or its contractor should develop all the information for the entire project area including scientific review by a qualified team similar to what was done in 1992. Subsequent streambed alteration agreements issued by the Department of Fish and Game could be based on and incorporate the recommendations made by

11-6 cont...

the lead agency's annual report. It is imperative that the lead agency not only develop a plan for annual review to mitigate resource impacts but also establish a protocol for annual allocation of sand and gravel.

Postseason review of compliance and evaluation should be conducted by the same team, plus a Department representative.

11-7

In 1992 vested rights and reclamation plans were approved for gravel extraction sites on Graham, Emmerson, Blue Lake and Johnson bars. According to the minutes of the Humboldt County Planning Commission and Humboldt County Board of Supervisors' (Board) meetings, in addition to correspondence with legal counsel for the applicant, Redwood Empire Aggregate, these reclamation plans by reference are subject to annual review procedures found in the draft reclamation plan (Appendix J). Attachment A of this draft reclamation plan is the basis for annual review based on environmental factors.

The Department of Conservation, in response to the notice of preparation, stated that all existing reclamation plans for gravel operations should conform to the mitigation measures adopted by this PEIR. It is our understanding that reclamation plans for Mad River Sand and Gravel, Eureka Sand and Gravel, Arcata Readimix, Mercer-Fraser and Humboldt County Public Works were approved through negative declarations based on environmental conditions which no longer exist. Therefore, all reclamation plans should be amended to reflect existing conditions of the Mad River to prevent further resource impacts. One could argue that these are, in fact, new projects based on the changes in environmental conditions.

11-8

We recommend that a minimum recovery thalweg elevation (red line) be developed for each affected reach of the Mad River. The rate of gravel replenishment diminishes with distance downstream because of past and continuing upstream extraction. It would be feasible to extract gravel from the Blue Lake area while the Johnson-Spini downstream bar remains severely degraded. Under the preferred alternative of mining volumes at less than recruitment levels the middle and lower Mad River reaches should eventually begin to build, but a specific delineation of desired bed elevation (that is, an established red line) should be made to guide gravel extraction at each site.

In a July 27, 1992, letter to the Board, counsel for the Mad River gravel operators Mr. William Davis agreed that all newly approved reclamation plans would establish baselines (with appropriate fixed elevations and geographical reference points). He further stated that such baselines should be identified as part of the Mad River EIR.

The draft PEIR also makes some specific statements which the Department believes are either unclear, not supported by the technical reports in volume II of the PEIR or we simply disagree:

Vol. I, Page 37. "The PEIR is not intended to prevent change in the riparian community but to assume that gravel extraction does not create irreversible adverse impacts on the processes of community succession, nor eliminate representations of specific successional communities."

DFG Response: Direct impacts of gravel extraction on riparian communities were identified in Appendix H (Karen Theiss and Associates):

> "Continued excavation in any one area precludes the natural evolution of terraces and subsequent development of riparian vegetation. The low-lying herbaceous and early scrub habitats would be the most affected. The localized long-term effects would include the loss of early stage scrub, the maturation of the later stage scrub and forest, a decline in vegetative diversity, a decline in wildlife habitat values, and a likely decline in wildlife diversity."

Gravel extraction can directly and indirectly affect riparian resources by removal or the alteration of natural hydrologic processes. These processes (gravel bar erosion/sedimentation) contribute to the diversity and age class variation of riverine vegetation. Instream gravel extraction can eliminate the gradual progression of succession, diminishing riparian habitat acreage and value.

11-9

The continued loss and degradation of riparian resources is of statewide significance. We are unclear as to the intended meaning of the repeated statement in the PEIR, "There is disagreement among professionals whether the loss of any one habitat area is significant." There is no information in the PEIR to substantiate this statement.

While we believe that riparian losses are significant, we have agreed to on-site mitigation for the loss of early successional vegetation consisting of red alder, willow, black cottonwood, from gravel bars subject to winter flow scour. We have recommended that this young plant material be relocated to areas of the project site (individual operations) with the highest likelihood of successful reestablishment.

In considering the lower Mad River riverine resource as a whole, it would be desirable to maintain a mix of riparian habitats, from sparse herbaceous vegetation to riparian forest and other habitats in between. We concur with the recommendation in Appendix H "that a gravel management plan be prepared by the County in order to provide scenarios which allow for continuing gravel extraction with a minimal impact to other resources of the riverine system."

Appendix D, the wildlife portion of the PEIR (Mad River Biologists, Mr. Ron LeValley), includes a description of the habitats and species expected within each habitat. No actual surveys were conducted for verification.

11-9 cont...

Management options for sensitive species were primarily dependent upon maintenance of "healthy riparian woodlands" or would be forthcoming after the spring field season. It is our understanding that this work will be completed.

11-10

In addition to proposed follow-up spring surveys on sensitive species and various riverine habitats, LeValley recommends that additional surveys be conducted during the summer months of July and August and, once the surveys are standardized, continue monitoring for at least five years. In addition, site-specific surveys for sensitive species should be conducted prior to each proposed gravel extraction operation. If sensitive species are found, operators could plan upcoming gravel extraction operations to avoid breeding periods and nesting areas, thereby minimizing potential impacts. We concur with these suggestions and further recommend that these surveys be conducted by a qualified biologist(s), preferably by the same individual(s) for the entire lower Mad River. We also recommend this proposal instead of "observations by operators on wildlife use" (proposed Annual Review procedures, Appendix J, page 32).

11-11

Vol. I, Page 58. "On the main stem a 25-foot waterfall near Bug Creek, about 24 miles above the former Sweasey Dam site stops upstream migration."

DFG Response: This fall was modified in 1980 by blasting and is no longer a migration barrier to steelhead.

11-12

Vol. I, Page 59. "The hatchery estimates that about 50 percent of their excess fish will spawn downstream of the hatchery while 50 percent may move upriver to spawn."

DFG Response: We concur with the assessment that water discharge from the hatchery may encourage a concentration of fish at or below the hatchery, but no estimates of hatchery-originated salmon or steelhead has been made.

11-13

Vol. I, Page 59. "Spawning below the hatchery may have little chance of success due to the unstable nature of the alluvial river bed" and "...spawning in this aggraded reach may be rather futile and the main beneficial fisheries use of the lower project area (below the hatchery) may be for adult migration up stream to more favorable spawning areas and juvenile migration downstream to the estuary and the ocean."

DFG Response: It is currently believed that most successful salmonid spawning occurs in tributaries because of scour during storm events. However, anecdotal information by anglers indicates that salmon spawn below the hatchery bridge. These mainstem spawners are at risk of egg loss, depending on the individual redd site. Many Central Valley rivers subject to annual scour produce large natural populations. It is difficult to dismiss any potential salmon or steelhead production area in light of the declining resources today. We believe that gravel extraction can continue without impacting spawning habitat.

11-14

Vol. I, Page 59. "There is also the belief that spawning in this reach is generally unsuccessful due to the unstable nature of the channel bottom. If spawning were successful, the progeny would compete with preferred wild native fish at various juvenile stages during the rearing."

DFG Response: See previous response. The Mad River Hatchery has been scheduled to be without funding beyond fiscal year 1994-95. Only naturally produced fish will occur if the hatchery is closed.

11-15

Vol. I, Page 59. "Some spawning takes place in the project area, mostly above Essex bar (Site No. 6, particularly during low flow years when access to tributaries and the upper river is limited."

DFG Response: Anecdotal information indicates spawning below the hatchery bridge every year. The magnitude and success of this spawning is unknown. The Mad River was surveyed in 1992 during drought conditions. Salmonids were observed spawning in tributaries and mainstem Mad River in all areas surveyed from Canon Creek to Hatchery Bridge.

11-16

Vol. II, Page 33. The Monitoring Standards (Appendix J, Attachment B) suggest that all the site maps be prepared on the most recent (preferably postextraction) air photo base. We believe annual extraction plans should be based on annual aerial photographs taken prior to extraction operations. Annual photographs would show channel changes and areas of overwinter recruitment to complement transects, clearly delineate the project and contribute to mitigation development.

Thank you for the opportunity to provide these comments. Questions should be directed to staff biologist Mr. Larry Preston at (707) 441-5736.

Sincerely,

Richard L. Elliott

Richard L. Elliott
Regional Manager

cc: Mr. Larry Preston
Department of Fish and Game
Eureka, California

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
5550 SKYLANE BLVD. SUITE A
SANTA ROSA, CA 95403
PHONE: (707) 576-2220

Comment Letter Number 12

June 11, 1993

Sidnie Olson
Humboldt County Planning Department
3015 H Street
Eureka, CA 95501

Dear Ms. Olson:

Subject: Program EIR for Mad River Gravel Removal; SCH# 92083049

12-1 I reviewed subject EIR for water quality impacts and mitigation measures. The EIR addresses water quality impacts as a result of instream mining only; it does not address water quality impacts from activities at gravel processing yards. As I stated in my September 14, 1992 comments on the Notice of Preparation, the Regional Board will regulate activities at gravel processing yards through implementation and enforcement of the Statewide General Permit for stormwater runoff as well as state regulations regarding proper handling of petroleum products.

12-2 Water quality impacts from mining activities in the river channel, including installation and removal of summer bridges, are adequately regulated by the California Department of Fish and Game. We concur with their recommendations and regulatory program.

12-3 I have comments on two potential impacts to water quality that may result from aggraded or degraded conditions in the lower Mad River. Section 5.4 describes potential groundwater quality impacts to percolation and recharge if the Mad River is allowed to aggrade significantly. Specifically, percolation from individual septic tank/leachfield sewage disposal systems and percolation at the City of Blue Lake's wastewater treatment facility may be severely reduced due to higher groundwater elevations.

Individual septic tank/leachfield sewage disposal systems currently are not located (and probably will not be constructed in the future) at low elevations that are likely to be affected by rising groundwater tables as a result of an aggraded river channel. Thus, the impact to individual disposal systems is less than significant.

The City of Blue Lake's percolation ponds, however, are very close to the Mad River channel and possibly could be affected significantly by an aggraded river channel. The result of reduced percolation capabilities may be wintertime discharges of treated wastewater directly into the Mad River above the HBMWD water supply intakes. The City of Blue Lake may be required to implement an alternative land disposal system. This is a very significant effect. Groundwater elevations at the percolation ponds currently are being monitored by

the City of Blue Lake. This information will be helpful in the decision-making process whether to allow the river to aggrade or degrade.

12-4

Section 5.12 describes potential impacts to public structures and utilities. The City of Blue Lake's wastewater treatment facility is protected from flooding and erosion by the Mad River with a long dike constructed by the US Army Corps of Engineers. If the Mad River is allowed to degrade, the River could undermine the RSP along the dike and allow the River to damage or destroy the wastewater treatment facility. As a result, untreated or partially treated wastewater may be discharged directly into the Mad River above the HBMWD water supply intakes, which is unacceptable. This is a very significant effect and cannot be permitted.

12-5

Mitigation measures to protect water quality and other environmental factors rely heavily on an annual review of each proposed extraction site and a recommendation to restrict the scope, method, type and intensity of annual extraction operations (H_2OQlty-3a). This agency supports the EIR's recommendation for this type of mitigation measure. The EIR does not describe who will make up the committee to do the annual review, nor does it describe what mechanism must be put in place to monitor and enforce the recommendations of the review committee. These issues should be addressed further in the final EIR.

Thank you for the opportunity to comment on the draft EIR.

Sincerely,

Thomas B. Dunbar

Thomas B. Dunbar
Associate Water Resource
Control Engineer

TBD:bp\tbdmadr

STATE OF CALIFORNIA PETE WILSON, *Governor*

STATE LANDS COMMISSION

LEO T. McCARTHY, *Lieutenant Governor*
GRAY DAVIS, *Controller*
THOMAS W. HAYES, *Director of Finance*

EXECUTIVE OFFICE
1807 - 13th Street
Sacramento, CA 95814-7187

CHARLES WARREN
Executive Officer

July 1, 1993

File Ref.: W 24873

Comment Letter Number 13

Carol Whiteside
State Projects Coordinator
The Resources Agency
1020 Ninth Street
Sacramento CA 95814

Sidnie L. Olson
Humboldt County Planning Department
3015 H Street
Eureka CA 95501

Dear Ms. Whiteside and Ms. Olson:

SUBJECT: Draft Program Environmental Impact Report (PEIR) on Gravel Removal from the Lower Mad River, SCH 92083049

Staff of the State Lands Commission (SLC) has reviewed the subject draft PEIR and has the following comments.

We are generally in support of the overall direction that the County is taking for aggregate mining in the Mad River, that is, to manage the river as a complex system, relying heavily upon the results of intensive monitoring of geomorphology, biological resources, and other important river factors. We have several suggestions pertaining to the proposed monitoring program as well as the management of extraction itself.

13-1

1. The PEIR proposes annual monitoring as the basis for management decisions. It is implied that aggregate extraction will also be managed on an annual basis. Some north coast rivers have a bank-full discharge of longer than 1-2 years, indicating that large amounts of sediment are not moved every year or so, but on a less frequent basis. In other words, the average annual replenishment rate may be too far from reality to be of use in managing aggregates under the current state of knowledge. The hydrology of the Mad River should be studied in conjunction with sediment transport to determine the frequency at which flows occur which move most or much of the extractable sediment in the system. We would like to suggest an alternative be evaluated that would manage mining on a longer period than one year.

13-2

2. The impact analysis of riparian vegetation repeatedly states that, "There is substantial debate as to whether the loss of any one habitat area, in comparison to the total habitat, is significant. The PEIR takes the conservative approach that even after mitigation the impact remains significant." We concur. However, since

13-2 cont...

the PEIR is supposed to examine impacts cumulatively, more analysis should be done on the amounts and kinds of riparian habitats which would comprise a desirable "total". The PEIR only evaluates individual sites. A comprehensive approach would be to inventory riparian vegetation for the whole study area, classifying and mapping vegetation by species and age composition. Using this present condition of the riparian vegetation on the Mad, in conjunction with historic data as appropriate, models of plant succession should be developed to predict future conditions of the "total habitat" with various aggregate management alternatives.

Because of the current degraded condition of the lower Mad, it may also be useful to examine riparian vegetation succession on other rivers in the north coast which have not been as influenced by tree cutting, aggregate extraction, or other modern human impacts.

13-3

3. Many impacts due to aggregate mining in the lower Mad could be avoided or reduced by extracting from sites as far downstream as possible. In fact, the most desirable location to mine from a river management standpoint may not be a currently proposed site. One mechanism for allowing different operators to mine at sites they do not currently own or have rights to is Transfer of Development Rights ("TDR'S"). Moving and restricting the site of allowable extraction downstream should be evaluated as another alternative for long-term aggregate management.

13-4

4. With regard to annual monitoring, we recommend, if possible, that the endpoints of cross-sections be referenced to the National Geodetic Vertical Datum (NGVD) and to the California Coordinate System.

Thank you for the opportunity to comment. If you need clarification on these comments, please contact Diana Jacobs at (916) 445-5034. As we noted in our September 21, 1992 letter, for questions pertaining to SLC jurisdiction, please contact Linda Martinez at (916) 322-6375.

Sincerely,

Mary Griggs

MARY GRIGGS
Environmental Review Section
Division of Environmental
Planning and Management

cc: Dwight E. Sanders
Linda Martinez
Diana Jacobs
OPR

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 1, P.O. BOX 3700
EUREKA, CA 95502-3700
TDD PHONE 707/445-6463
(707) 445-6412

July 3, 1993

1-Hum-101-89.63
1-Hum-299-1.5/5.6
Draft PEIR for Mad River
Gravel Extraction
SCH #92083049

Comment Letter Number 14

Ms. Sidnie L. Olson
Humboldt County
Planning Department
3015 H Street
Eureka, CA 95501-4484

Dear Ms. Olson:

We have reviewed the Mad River draft Program Environmental Impact Report (PEIR) for the annual surface mining of sand and gravel from ten sites along the Lower Mad River, from the old Sweasey Dam site downstream to the Hammond Bridge, which is downstream of the Route 101 Mad River Bridge. We have the following comments:

We commend the County for developing the draft PEIR which includes responsible mining limitation recommendations to reduce impacts of gravel extraction operations on the environment and bridge structures on the Mad River.

14-1

The draft PEIR and supporting documents conclude that excessive gravel extraction in the Mad River has caused degradation resulting in undermining of public utilities and bridge structures (see pages 38 and 39; Appendix F, Section III, page 26; and Appendix B, page 11). The PEIR recommends an extraction limit of 125,000 cubic yards per year (pages 38 and 39). The River Institute recommends 150,000 cubic yards if the river is to remain in current state, and 100,000 cubic yards if the objective is to induce aggradation (Appendix F, Section III, page 27). We request the final PEIR explain the rationale used to determine the recommended 125,000 cubic yard limitation.

We agree with the Mitigation Measure Morph-1a (page 39) stating "extraction volumes shall be below the annual replenishment rate", and recommend this measure be in effect as of the certification date of the PEIR.

14-1 cont...

We recommend the final PEIR establish a redline at or above the current river bed elevation at bridge structures, as previously requested in the attached correspondence to the County dated December 18, 1992 and March 25, 1993. If a redline is not established, we request the final PEIR provide an explanation.

We recommend that the final PEIR respond to the following questions:

1. Will Mitigation Measure H2OQlty-3a (page 36), providing for annual review, be in effect prior to completion of the Aggregate Resources Management Plan (ARMP)? If not, the PEIR and ARMP should be completed concurrently.

2. Will Mitigation Measure Morph-1a (page 39) stating "extraction volumes shall be below the annual replenishment rate" be in effect prior to completion of the Aggregate Resources Management Plan (ARMP)? If this mitigation measure will not be in effect, an explanation should be provided.

3. How will the proposed 125,000 cubic yard limitation amount be allocated to the various operators prior to the adoption of the ARMP? How will the operators with existing entitlements (e.g., Conditional Use Permits, Surface Mining Permits, Vested Rights and Reclamation Plans) be subject to the requirements of the PEIR?

The PEIR recommends Alternative #2, Extraction Below Replenishment (page 188), but defers implementation to a future unscoped and unfunded ARMP (page 2). The requirement that the applicant adopt mitigation measures recommended in a future study (ARMP) is in direct conflict with the guidelines implementing CEQA. California Code of Regulations, title 14, section 15070, subdivision (b) (1) provides that if an applicant proposes measures that will mitigate environmental effects, the project plans must be revised to incorporate these mitigation measures "before the proposed negative declaration is released for public review". Environmental problems should be considered at a point in the planning process "where genuine flexibility remains" (Mount Sutro Defense Committee v. Regents of University of California, supra 77 Cal. App. 3d 20, 34.) A study conducted after approval of a project is not acceptable and will inevitably have a diminished influence on decision making.

14-2

We understand, per memorandum dated June 25, 1993 from Christine Sproul (California Department of Forestry) to Mike Chrisman (Resources Agency), that the County and gravel mining

14-2 cont...

operators have proposed an amendment to extend the Mad River Memorandum of Agreement (MOA). We recommend that the MOA be extended until the PEIR and ARMP can be certified by the County concurrently. If the County elects to certify the final PEIR prior to the completion of the ARMP, we recommend that the County: 1) establish a development and implementation schedule for the ARMP, 2) include in the final PEIR interim river management measures to be implemented until such time the ARMP is completed, 3) identify the review process for the ARMP, and 4) clarify the roles and responsibilities of Caltrans and other agencies in the implementation of both the PEIR and the ARMP. The interim measures should include designation of technical consultants (possibly the previously utilized Scientific Committee) to:

1. Analyze prescriptions (identified by the Scientific Committee as a result of the MOA) from the previous year and the river's response.

2. Prepare annual prescriptions for extraction methodologies and locations to ensure protection of resources including bridge structures. As requested in our March 25, 1993 letter to the County (attached), "we suggest an interim redline be established at or above the current river bed elevations." Prescriptions should be established to assure additional degradation does not occur at bridge structures.

3. Assure that total extraction does not exceed 125,000 cubic yards per year, with the understanding this limitation may be adjusted based upon documented aggradation or degradation.

It is understood, per mitigation measure H20Qlty-3a (page 36), the monitoring information to accomplish the above tasks will be completed by Humboldt County Planning Department and the California Department of Fish and Game.

14-3

Channel Bed and Bank Erosion, Appendix F, Section II, page 8 identifies channel bank erosion that has occurred both upstream and downstream of the Route 299 and Route 101 bridges. In addition, lateral migration of the active channel near the intersection of North Bank Road (Route 200) and Azalea Road is discussed. These are more generally identified as impacts in the PEIR in Morph-4a (page 40). We support the suggested mitigation measures Morph-4a and Morph-4b. Any revegetation proposed as mitigation to occur within the Sate highway right of way would require an encroachment permit.

14-4

We object to Mitigation Measure Morph-1b (page 39), indicating Caltrans or other agencies shall reconstruct or retrofit the bridge supports by the year 1998. We strongly recommend modification in the final PEIR, deleting Caltrans as an agency to mitigate degradation of the streambed. We disagree with the premise that Caltrans is responsible for damage caused to the structures along the Mad River. As indicated in the attached March 25, 1993 letter to the County, it is Caltrans' intent to upgrade bridge structures, dependent upon funding availability, but a specific timeframe for this project has not been determined. The PEIR cannot require mitigation that requires a third party (such as Caltrans) to complete work without third party concurrence and documented agreement.

14-5

We object to Mitigation Measure Fish-4c (page 65), calling for the removal of the boulder cascade. We recommend modification in the final PEIR, to provide for an alternate fish passage structure. Removal of the boulder cascade will endanger stability of the Mill Creek bridge (Impact PU&S-6, page 156 and discussion on pages 138 and 139). It appears from review of our project files, fish passage was not impaired when the bridge was originally constructed. We believe the boulder cascade was placed in response to degradation of the Mad River after original construction. The boulder cascade referenced in Appendix F, Section V, page 9, was necessary to protect bridge foundations from downcutting of Mill Creek as has occurred at Warren and Lindsay Creeks. Impairment of fish passage was likely caused by mining operations. The proposed mitigation measure work is within Caltrans right of way. We would not issue an encroachment permit for the proposed removal of the boulder cascade. We would, however, be receptive to alternate fish passage structures that would not impact the integrity of the bridge structure.

14-6

We object to Mitigation Measure Morph-6a (page 42) allowing trenching as an acceptable method of gravel extraction from the Mad River. The PEIR in Appendix F, Section 1, page 2, discusses the negative impacts of trenching on the river bed, similar to those of pits, which may cause long distance upstream migration of the knickpoint and "presents an immediate danger to nearby bridges." We recommend that trenching be excluded as an acceptable mining method on the Mad River under the final PEIR.

14-7

It is not clear why Caltrans is included as a monitoring party for the Mitigation Measure Traffic-1 (page 114).

14-8

Due to the close proximity of mining operations to the rail line, we recommend the final PEIR address the use of rail to transport gravel as an alternative to highway transportation, to reduce the impact of increased trip generation to the state highway system.

We complement the County for directing their efforts to develop a comprehensive ARMP for the Lower Mad River, and look forward to working closely with the County during the development process of this document.

Should you have any questions please call Dave Carstensen at (707) 441-5813.

Very truly yours,

CHERYL S. WILLIS, Chief
Transportation Planning
Branch

Attachments

cc: Michael Chiriatti
State Clearinghouse
1400 Tenth Street
Sacramento, CA 95814

Resources Agency

Comment Letter Number 15

State of California — RCES AGENCY OF CALIFORNIA

MEMORANDUI

To: Mr. Douglas P. Wheeler
Secretary for Resources

Date: June 11, 1993

RECEIVED
JUN 21 1993
HUMBOLDT COUNTY
PLANNING COMMISSION

Ms. Sidnie L. Olson
Humboldt County Planning Department
3015 H Street
Eureka, CA 95501

From: Department of Conservation - Office of Governmental and Environmental Relations

Subject: Draft Program Environmental Impact Report (Draft PEIR) for gravel removal from the Lower Mad River, **SCH# 92083049**

The Mined-Land Reclamation Project staff of the Department of Conservation's Division of Mines and Geology (DMG) has reviewed the Draft PEIR for Gravel Removal from the Lower Mad River. The following comments, prepared by James Pompy and Michael Sandecki, are offered to assist in your review of the project.

General

- There is much useful information contained in this Draft PEIR. At the same time it is apparent that some significant questions remain unresolved.

15-1

- It is important to implement a monitoring procedure to document future channel conditions, to limit annual mining volumes, and to establish criteria to direct future mining activities. Given the normal rainfall pattern this year, as compared to the last several years of drought, it will be important to examine the physical changes that took place in the Mad River this year in order to effectively plan mining activities for 1993.

Sediment Budget

15-2

- The long term average bedload sediment yield, of 100,000 to 150,000 cubic yards of sand and gravel per year, is a useful parameter to plan extraction activities on the Mad River. A corroborative line of evidence is the in-filling rate for Sweasy dam. According to Brown (WRI 26-75, 1975), over 2,000 acre-feet of sediment was released from the impoundment at its debouchment in 1970. This yields an average capture rate of about 100,000 cubic yards per year. We have no more specific documentation that describes the extent of filling of Sweasy Dam. However, if the entire storage capacity of Sweasy Dam had been filled with sand and gravel (about 3,000 acre-feet), an average transport figure of 150,000 cubic yards would be demonstrated. These values are in close agreement to the high and low long term averages cited in the Draft PEIR.

15-3

- In determining a sediment budget for the Lower Mad River, the change over a period of time in the stored volume of sand and gravel in the bed of the Mad River was extrapolated from differences in cross sectional areas at measured locations along the Mad River. This volume, compared to the mined volume of material, minus the volume of expected transport of bedload material into the Blue Lake Valley, should match fairly closely. However, these measurements show that the bed was enlarged by a factor of only about one-half and about one-sixth of the offtake rate (minus the transport rate) in the hatchery to 299 reach and 299 to 101 reach, respectively. The lack of a commensurate response of the bed dimensions to the mined volume seems to indicate that the volume deficit manifested downstream of 101. The enlargement of the Mad River estuary may be a result of this change.

15-4

- Our recommendation is to tighten up the surveying program and extraction volume recording procedures to resolve future questions on the sediment transport rate. This could be handled by a monitoring program similar to that proposed in Appendix N (1993 1603 Notification Process) but should be expanded to also collect cross section data in non-mined reaches. It should be clear that the task of determining what action to take relative to the results of the monitoring program is ultimately a lead agency decision (to be made in consultation with interested agencies such as the Department of Fish and Game and Caltrans.)

Hydraulic Effects of Mining Methods

15-5

- The technical appendices cite the destabilizing effects of trench and pit mining methods in redirecting the flowcourse and interrupting (capture) bedload transport. The latter is critical to bed stabilization in downstream reaches. No benefits to fish were cited.

  Trench and pit mining should be addressed in the impact analyses sections or should not be used. The mitigation for specific impacts of using these methods should be identified if they are to be used.

15-6

- An analysis of alternative bar skimming methodologies, such as retaining the upper third of each mined bar, should be incorporated in the PEIR. This particular methodology could be employed in normal or above-average transport years and would serve to better distribute material to downstream operators.

Alternatives

15-7

- The alternative that involves utilizing offsite, instream sources will not simply relocate the project impacts as the Draft PEIR concludes. The Eel River, for example, has a much larger sediment budget than the Mad River, and can sustain a higher production rate. Non-mined or intermittently mined channels, as well, may be capable of producing material in accordance with their sediment budgets, without entailing bed degradation and impacts occurring therefrom. The impacts of mining the Mad River are due to mining without regard to the sediment budget.

15-8

- The document should describe impacts and mitigation for an alternative that would portion the removal of about 100,000 cubic yards of material per year over several sites that are currently approved for mining.

- Alternatives that involve removal of 100,000 cubic yards or material per year, without respect to the annual lowering or aggradation of the channel, as reflected by a cross section monitoring program, should assign a redline or cutoff elevation to the depth of mining that is acceptable under that alternative. With several consecutive years of low sediment supply, mining at the long term average transport rate could still undermine structures in the channel within that time frame. The data collected in the monitoring program should be used primarily to ensure these elevations are not exceeded.

Impacts and Mitigation

15-9

- Mitigation that requires wholesale rebuilding and retrofitting of bridges, wells, utilities crossings, and stream bank revetment does not appear to be feasible.

15-10

- The PEIR should reflect that utilities (such as sewer lines) that utilize bridges for crossing the Mad River and its tributaries are equally impacted, as are the bridges, by bed lowering. The implication that utilities that use the bridges are not vulnerable is like saying that the bridge foundation, but not the roadbed, is impacted by bed lowering.

15-11

- Mitigation for protecting Mill Creek should include an assessment of the stability and effectiveness of the concrete sill described in the appendices.

15-12

- Groundwater impacts described due to bed lowering reflect a worst-case scenario. It is not clear that the possible impact to groundwater is significant.

15-13

The impact to the Humboldt Municipal Ranney collectors and surface intake should be better described. The description of the Ranney collectors indicates that the depth of the intakes would preclude significant detriment unless tens of feet of bed lowering were incurred. However, the surface intake is quite vulnerable to any lowering or aggradation of the bed.

15-14

- One mitigation proposed is to remove barriers to fish migration. The proposal should first be examined as to the possible destabilizing influences on the channel.

Terminology

15-15

- Replenishment implies that material is actually deposited within a reach of channel (note that the document states that replenishment equals recruitment, and that the replenishment rate could be enhanced.) The transport rate is a more accurate term for supply from upstream. Also, alternatives should more clearly state that it is the long term average transport rate that will be considered in planning annual mining offtake volumes.

15-16

- Several sections refer to the "significance" being "significant." The statements should read the impact is significant.

If you have any questions on these comments or require any assistance with other mine reclamation issues, please contact James S. Pompy (916) 323-8565.

Stephen E. Oliva
Acting Environmental Program Coordinator

cc: L. Preston, Department of Fish and Game
D. O'Bryant, Department of Conservation, OMRRC

Comment Letter Number 16

[8] From: STEVE HUBBARD 5/ ./93 11:14AM (
To: HUM_CO_CEQA_FIRE_SAFE
cc: HUU - 1215, HUU - EUREKA RES MGMT, FL
Subject: Mad River Surface Mining, Olson,
---------- Message Contents ----------
THIS IS AN ELECTRONIC-MAIL DOCUMENT DELIVERED FROM J. R. McCOLLISTER, UNIT CHIEF, BY STEVE H. HUBBARD, ENVIRONMENTAL COORDINATOR, REGARDING THE SUBJECT LISTED ABOVE.

State_of_California_____The_Resources_Agency
DEPARTMENT of FORESTRY and FIRE PROTECTION
Humboldt-Del Norte Unit
118 South Fortuna Boulevard
Fortuna, California 95540
(707)-725-4413

Thomas D. Conlon
Planning Director
Humboldt County Planning Department
3015 H Street
Eureka, CA 95501

Mr. Conlon,

In addition to the January 1, 1992 document "Project Review Input Basic To All Development Projects" and our letter dated 10-06-92, CDF has the following input:

16-1 Comments submitted by the CDF on September 6, 1992 are still appropriate for this program EIR. However, those comments were qualified as to the negative impact or disturbance to the timbered area. If gravel extraction requires harvest of timber from the site or timbered area is cleared for extraction or treatmnet facilities a timberland conversion permit and Timber Harvest Plan may be required. No Conversion of timberland or commercial timber operations may occur until the appropriate plans and permits are submitted to CDF and approved.

----------END----------

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

In Reply Refer To:
PPN 1191
1-1-93-TA-872

Comment Letter Number 17

July 2, 1993

Ms. Sidnie L. Olson
Humboldt County Planni
3015 H Street
Eureka, California 95501-4484

ED

PLANNING COMMISSION

Subject: Draft Program Environmental Impact Report for Gravel Removal from the Lower Mad River; Mad River, Arcata/Eureka, Humboldt County, California

Dear Ms. Olson:

17-1

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Program Environmental Impact Report (Draft PEIR) for Gravel Removal from the Lower Mad River in Humboldt County, California. These comments are intended to assist you in your preparation of the final environmental documents, and will not take the place of any formal comments that may be required under the provisions of the Fish and Wildlife Coordination Act.

The proposed project encompasses ten separate gravel extraction operations from the former Sweasey Dam site to the Hammond Trail bridge along the lower Mad River. Collectively, these projects propose to extract a maximum of 817,000 cubic yards of river-run material annually.

The Mad River supports runs of chinook and coho salmon, steelhead and coastal cutthroat trout. These species migrate upstream and downstream past the proposed project sites. Spawning and rearing habitat for salmon and steelhead occur in this stretch of the river. Riparian habitat along the river corridor is dominated by willow and alder. These riparian areas support a diverse assemblage of resident and migratory wildlife species. Several federally listed and candidate species are known to occur along the Mad River.

17-2

The proposed project has the potential to disturb nesting northern spotted owls during the period of February 1 through July 31 and nesting marbled murrelets during the period of April 1 through September 15. This potential for disturbance is of concern where the river bank is within 0.25 mile of suitable nesting habitat for these species. In such situations, the project proponent should present information to the Service regarding the current noise levels at each location and the expected increases in noise. If the proposed levels of increased noise are significant, the project proponent should survey all suitable habitat in accordance with the most recent Service approved protocol to determine the presence or absence of these species. Because the significance of increased levels of disturbance are judgement determinations based on site specificity, it may be appropriate for the

project proponent to contact the Service when evaluating these effects.

17-3

According to the Draft PEIR, this document constitutes a preliminary step for developing an Aggregate Resource Management Plan for the lower Mad River. The development of this plan is intended to allow for annual assessments of environmental conditions along the river through collection of monitoring data and to modify or restrict annual gravel extraction operations if necessary to protect river resources. The Service fully supports the development of this plan as the appropriate strategy to deal with river bed degradation, and its resultant adverse impacts on fish and wildlife resources along the river. However, we note that a comparable plan was broached in the Final Program Environmental Report for gravel removal on the lower Eel River. This environmental document was finalized and certified in July, 1992. To our knowledge, the River Management Plan for the lower Eel has not been initiated during the past year and the timeframe for future preparation of such a plan has not been defined. While we support development of an Aggregate Resource Management Plan for the lower Mad River (and also the lower Eel River plan) to facilitate environmentally-sound gravel extraction operations, we also urge the County to develop this plan, which should identify a lead agency and viable funding mechanism in a timely manner, in order to deal effectively and expeditiously with gravel removal on the river. We maintain that realization of the proposed mitigation measures in the Draft PEIR may only be attained with the ultimate implementation of this plan.

If you have any questions about these comments, please contact Jim Browning at (916) 978-5408 (No. 1), or Alison Willy or Michael Horton at (916) 978-5408 (No. 2) regarding specific guidance on northern spotted owl and marbled murrelet issues.

Sincerely,

for Wayne S. White
Field Supervisor

cc: Reg. Dir., ARD-ES, FWS, Portland, OR
COE, San Francisco, Regulatory Branch
EPA, San Francisco
Dir., CDFG, Sacramento
Reg. Mgr., CDFG, Reg. I, Redding

Comment Letter No. 1

Person, Organization or Public Agency making comment

Redwood Region Audubon Society
Conservation Committee
Lewis Klein
P.O. Box 1054
Eureka, CA 95502

Comment Identification Number	Response

1-1 **Comment noted.**

Response: This comment addresses the adequacy of the project description.

First, as suggested by the comment, the management plan is *not* the project. At the time the Draft PEIR was prepared it was intended that the ARMP would be a subsequent project, which used the certified PEIR as its environmental document (See Section 1.4, 'Intended Uses'). Under the Proposed Final PEIR, the ARMP is included as Attachment 1. The ARMP provides recommendations for the implementation, enforcement and monitoring of the preferred alternative and the recommended mitigation measures found in the Proposed Final PEIR, Sections 6.0 through 6.5.

Second, the "rule" referred to: "An accurate stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." (County of Inyo v. City of Los Angeles (1977)), appears to relate to the consistency of a project description. In County of Inyo v. City of Los Angeles (1977) the primary harm, or issue was "the incessant shifts among different project descriptions" which confused the public and commenting agencies, thus diminishing the usefulness of the process "as a vehicle for intelligent public participation." The Court added that "[a] curtailed, enigmatic or unstable project description draws a red herring across the path of public input." (71 Cal. App.3d at 197-198 [139 Cal.Rptr. 396].)

The Project Description is clearly defined in Section 1.2, and is consistent throughout the PEIR. We agree that the "project" is unusual, particularly when: six of the operations received vested right entitlements in 1975 by the State Legislature through adoption of the Surface Mining and Reclamation Act (SMARA); two operations have already received entitlements through the granting of Conditional Use Permits by the County, and; only two of the known operations have yet to determine their entitlements.

The Proposed Final PEIR includes Section 1.3a, "Implementation" to clarify the County's vs. the responsible and trustee agencies authority to implement,

enforce and monitor the recommendations in the Proposed Final PEIR and ARMP.

We disagree that the Project Description is inadequate. We believe the project description is consistent throughout the PEIR and sufficiently describes the project in a way that is meaningful to the public, to the reviewing agencies, and to the decision-makers.

1-2 Comment noted.

Response: This comment addresses the adequacy of Section 4.0, 'Environmental Setting.' We believe Section 4.0, Environmental Setting to be adequate for a reasoned and reasonable understanding of the Mad River, its environs and the potential impacts of surface mining.

The comment describes Section 4.0 as "sketchy and incomplete." Unfortunately without further detail, we cannot determine which aspects of Section 4.0 that the commentor finds to be "sketchy and incomplete."

Nevertheless, the California Administrative Code (CAC) Section 15125 states "The [environment] description shall be no longer than is necessary to an understanding of the significant effects of the proposed project and its alternatives."

The environmental setting in and along the Mad River is constantly changing. Both in terms of seasonal and yearly migration habits; and natural changes in the relationships between the biological, fisheries and vegetative species and habitats; and natural aggradation and degradation. It is not the intent of CEQA to describe all the numerous and varied potential habitat or species variations, in fact, to do so would require a considerable degree of forecasting and speculation.

The purpose of the Environmental Setting is to provide a reasonable understanding of the environment so that the cumulative impacts resulting from surface mining can be ascertained. Pursuant to CAC Section 15144, we have believe we have used our best efforts to find out an disclose all that we reasonably can.

1-3 Comment accepted.

Response: The Proposed Final PEIR has been amended to include the biological studies referred to in this comment, see Attachment 3.

The preparation of the PEIR is the result of a 1992 Memorandum of Agreement (MOA) between certain Mad River gravel operators, the County and state agencies. The MOA specified time frames for the approval of the PEIR. These time frames required that the PEIR be approved by June 15, 1993. Unfortunately, the drafters of the MOA did not consider the seasonal timing necessary for the biological studies, which we agree are integral to the PEIR.

1-4 Comment accepted.

Response: This comment addresses the lack of detailed information about the procedure and implementation of the annual review described in the Draft PEIR.

The Proposed Final PEIR includes as Attachment 1, the Aggregate Resources Management Plan (ARMP). The ARMP provides recommendations for the implementation, enforcement and monitoring of the preferred alternative and the recommended mitigation measures of the Proposed Final PEIR, see Sections 6.0 through 6.5.

As discussed in Section 1.3a, Implementation, the County has very limited authority for implementation, monitoring and enforcement of the PEIR and ARMP. Therefore, the regulatory authority over the provisions of the ARMP automatically defaults to the state and federal trustee and responsible agencies.

The ARMP describes the recommended: pre-season and post-season review process; monitoring program; enforcement process; public participation process; procedure for biologic, fisheries and vegetative surveys; and the process for determining the annual extraction locations and amounts.

We believe the ARMP addresses the concerns and inadequacies of the Draft PEIR as expressed in this comment.

1-5 Comment noted.

Response: See Proposed Final PEIR Section 1.3a, and responses to Comments 1-3 and 1-4.

PRC, Section 21081.6 requires that "Prior to the close of the public review period for a draft environmental impact report..., a responsible agency, or a public agency having jurisdiction over natural resources affected by the project, shall either submit to the lead agency complete and detailed performance objectives for mitigation measures which would address the significant and environmental effects identified by the responsible agency or agency having jurisdiction over natural resources affected by the project, or refer the lead agency to appropriate, readily available guidelines or reference documents."

The responsible and trustee agencies, including the CA Department of Fish & Game and the State Lands Commission have not provided the County with complete and detailed performance objectives nor referred the lead agency to appropriate, readily available guidelines or reference documents.

Further, Section 1000 of the Fish and Game Code requires that "the department [of Fish & Game] shall expend such funds as may be necessary for biological research and field investigation and for the collection and diffusion of such statistics and information as shall pertain to the conservation, propagation,

protection, and perpetuation of birds and the nests and eggs thereof, and of mammals, reptiles and fish."

In the absence of this information, the County developed the recommended mitigation and monitoring program in the ARMP, Attachment 1. At this time, it will be the responsibility of the trustee and responsible agencies to implement, monitor and enforce the provisions of the ARMP.

We agree that pursuant to Public Resources Code Section 21092.1, the Proposed Final PEIR, including the ARMP should be recirculated. The comment period for the Proposed Final PEIR is scheduled for 45 days commencing September 10, 1993 and ending on October 25, 1993.

1-6 Comment does not raise a significant environmental point.

Response: The modification of state and federal threatened or endangered species lists is beyond the scope of this PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

1-7 Comment does not raise a significant environmental point.

Response: This comment reiterates adopted County policy documents, and does not address a significant environmental point or the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

1-8 Comment does not raise a significant environmental point.

Response: See response to Comment 1-7.

Pursuant to CAC Section 15088 and 15132, no response required. However, the suggested text change is reasonable and the Proposed Final PEIR has been modified to read:

(p.30, last par.)

> "In short, the mitigation measures proposed in this PEIR will ensure that gravel extraction on the Mad River conforms with the intent and purpose of the established goals and polices of the local coastal and general plans."

1-9 Comment noted.

Response: See response to Comment 1-5 regarding implementation and the responsible and trustee agency roles.

Pursuant to CAC Section 15150 "An EIR...may incorporate by reference all or portions of another document which is a matter of public record or is generally available to the public. Where all or part of another document is incorporated by reference, the incorporated language shall be considered to be set forth in full as part of the text of the EIR..."

In addition, CAC Section 15148 states: "Preparation of EIR's is dependent upon information from many sources, including engineering reports and many scientific documents relating to environmental features. These documents should be cited but not included in the EIR."

The regulations of public agencies are readily available from the individual agency, we include the phone numbers of the agencies cited in the comment for the commentor's reference:

Regional Water Quality Control Board ..... (707) 576-2220
U.S. Army Corps of Engineers ..... (415) 744-3318
California Department of Fish & Game ..... (707) 445-6493

1-10 Comment accepted.

Response: See response to Comment 1-4 regarding the ARMP.

1-11 Comment noted.

Response: This comment address mitigation measure Morph-1a, extraction below replenishment. This issue has been more fully discussed in Section 6.0, 'Alternatives', which has been modified to include additional alternatives and a preferred alternative, and the ARMP.

The Proposed Final PEIR includes the ARMP as Attachment 1. The ARMP provides recommendations for the implementation, enforcement and monitoring of the preferred alternative and the recommended mitigation measures of the Proposed Final PEIR. We believe the revised Alternative Section and the ARMP will address the concerns and inadequacies expressed in this comment.

1-12 Comment noted.

Response: See response to Comment 1-4 regarding the ARMP.

1-13 Comment accepted.

Response: Mitigation measure Morph-5a which requires extraction above replenishment, has been deleted from the Proposed Final PEIR. See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

1-14 Comment noted.

Response: We direct the commentor to the discussion in the Draft PEIR on hatchery management practices, p. 59 par 3 & 4. As noted in par. 5, p. 59, this is an area of controversy. Whether the fish using this reach are primarily

rejected hatchery fish, or not, has/had no bearing on the identified impacts or the recommended mitigation measures.

To eliminate any confusion over the potential importance of the statement under question, we have deleted it from the Proposed Final PEIR, see p. 59b, par. 2.

We agree that fishery management should be included in the annual review process. We refer the commentor to the response to Comment 1-4 and the ARMP, Attachment 1.

1-15 Comment noted.

Response: See response to Comment 1-5.

As stated in the Draft PEIR, p. 60, par. 6, there is little direct information on Mad River coastal cutthroat trout. Under CAC, Section 15145 if a "particular impact is too speculative for evaluation, the [lead] agency should note its conclusion and terminate discussion of the impact."

1-16 Comment noted.

Response: See response to Comment 1-2 and Appendix C.

Pursuant to CAC Section 15130 "Cumulative impacts shall be discussed when they are significant" and "The discussion [of cumulative impacts] should be guided by the standards of practicality and reasonableness." In addition CAC Section 15145 states that if a "particular impact is too speculative for evaluation, the [lead] agency should note its conclusion and terminate discussion of the impact."

The PEIR acknowledges the importance of riparian habitat both from a vegetative and a biologic standpoint, and the PEIR identifies potentially significant impacts caused by surface mining with recommendations for mitigation. For the purpose of CEQA, a Cumulative analysis includes an analysis of a particular project viewed over time and in conjunction with other related past, present, and reasonably foreseeable future projects whose impacts might compound or interrelate with those of the project. CEQA does not require an analysis of impacts resulting from other unrelated projects.

We believe that the PEIR discussion of cumulative impacts is practical and reasonable and includes impacts resulting from the project viewed over time and in conjunction with other related past, present, and reasonably foreseeable future projects.

1-17 Comment accepted.

Response: The text has been amended as follows:

(pg. 72, par. 9)

"Bald Eagles are rare in Humboldt County. Three nests are known in the county, one is above Korbel in the present study area. Scattered sightings of Bald Eagles along the coastal portion of the Humboldt Bay area may refer to this pair and its offspring, or an occasional outside visitor. At the present t~~T~~here are no ~~current or proposed~~ gravel operations in the vicinity of the known Bald Eagle nest~~habitat~~."

We believe the ARMP, Attachment 1, addresses the other concerns and inadequacies expressed in this comment. In addition, Attachment 3 includes the biological studies referred to in this comment.

See also, response to Comments 1-3 and 1-4.

1-18 Comment does not raise a significant environmental point.

Response: The modification of the Uniform Building Code, which regulates grading and stockpiles, and the Department of Fish and Game regulations is outside the scope of this PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

The authority for implementing, enforcing and monitoring the mitigation measures Wild-1b and Wild-1c are currently the responsibility of the California Department of Fish & Game. Consequently, the suggested text changes have not been incorporated into the Proposed Final PEIR.

1-19 Comment noted.

Response: See Appendix C, and response to Comments 1-4, 1-5 and 1-16.

The ARMP provides recommendations for the implementation, enforcement and monitoring of the preferred alternative and the recommended mitigation measures of the Proposed Final PEIR. We believe the ARMP addresses the concerns and inadequacies expressed in this comment.

1-20 Comment noted.

Response: See response to Comments 1-1, 1-4, 1-5 and 1-6.

1-21 Comment noted.

Response: See response to Comment 1-4.

1-22 Comment does not raise a significant environmental point.

Response: See response to Comment 1-9.

This comment does not address a significant environmental point or address the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

Bob Brown of Rising Sun Enterprises, the consultant who prepared the background material on traffic, indicates that the standard used for determined acceptable "Level of Service" is from the Caltrans Highway Capacity Manual.

1-23 Comment noted.

Response: See Appendix C, and response to Comments 1-5 and 1-16.

PEIR Sections 5.11 and 5.14 acknowledge the importance of recreation, and identify potentially significant impacts on recreation caused by surface mining. These Sections also include recommendations for mitigation. We believe that the PEIR discussion of cumulative impacts is practical and reasonable.

1-24 Comment noted.

Response: For purposes of the PEIR, "receptors" means those who receive or are affected by the noise being generated.

Section 5.11, Table 5.11-2 summarizes the noise measurements taken by Rising Sun Enterprises. The last row in the table shows the effect of noise on river users, at 100 feet from extraction operations. For safety reasons, it was presumed that recreational use of the river would not be closer than 100 feet from the extraction operations. All main processing sites are greater than 100 feet from the river bars.

Table 5.11-1 shows the acceptable/unacceptable Community Noise Exposure levels from the Humboldt County Framework General Plan. The Summary section on page 123 of the PEIR discusses the acceptability of noise levels generated by the project.

1-25 Comment noted.

Response: See response to Comment 1-4 regarding ARMP.

1-26 Comment noted.

Response: Section 6.2 discusses the comparative impacts of the alternatives. The comment misinterprets the intent of the statement within this Section, "However, because of the dynamic nature of the river and the habitats associated with it, and the existing recreational use of the river, there may be impacts to water quality that are not a result of gravel extraction operations."

It is not implied that these impacts *are* significant. In fact, the extent of the impacts resulting from other than surface mining are too speculative to predict and therefore pursuant to CAC Section 15145 if a "particular impact is too

speculative for evaluation, the [lead] agency should note its conclusion and terminate discussion of the impact."

1-27 Comment noted.

Response: See response to Comment 1-26.

1-28 Comment does not raise a significant environmental point.

Response: The analysis of impact resulting from other than surface mining are too speculative and are outside the scope of this PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

See response to Comment 1-5 and 1-16.

1-29 Comment does not raise a significant environmental point.

Response: The analysis of impact resulting from other than surface mining are too speculative and are outside the scope of this PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

See response to Comment 1-16.

1-30 Comment noted.

Response: See response to Comment 1-26.

1-31 Comment noted.

Response: See response to Comment 1-11 regarding alternatives.

Pursuant to CAC Section 15126 (d) in Section 6.0 through 6.5 we have described "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain the basic objectives of the project." Additionally, "The range of alternatives required in an EIR is governed by the 'rule of reason' that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision-making and informed public participation. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative."

As discussed in Section 6.4, the implementation of Alternative 4 - the Off-site Alternative is remote and speculative and is not recommended as an alternative to replace the project.

1-32 Comment noted.

Response: See response to Comment 1-31.

1-33 Comment noted.

Response: See response to Comments 1-1 and 1-31.

Comment Letter No. 2

Person, Organization or Public Agency making comment

California Trout, Inc.
Fred Neighbor, Attorney at Law
494 H Street
Arcata, CA 95521

Comment Identification Number	Response

2-1 **Comment does not raise a significant environmental point.**

Response: The comment is informative and does not address the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

2-2 **Comment does not raise a significant environmental point.**

Response: The reconstruction and/or retrofitting of bridges is the responsibility of Caltrans and discussion of potential impacts that may result from bridge work is outside the scope of this PEIR. The mitigation measure, Morph-1b, which recommended the reconstruction/retrofitting of public utilities and structures has been deleted from the Proposed Final PEIR.

See response to Comments 8-3, 9-2, 14-4 and 15-9, and Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

2-3 **Comment does not raise a significant environmental point.**

Response: See response to Comments 1-1, 1-4 and 1-5.

The comment is informative and does not address the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

2-4 **Comment does not raise a significant environmental point.**

Response: See response to Comments 1-1, 1-4 and 1-5.

The determination of Public Trust land/boundaries is a legal issue and is outside the scope of this PEIR. Nevertheless, the implementation of the ARMP and the recommended mitigation measures will reduce the impacts identified in the PEIR, regardless of the Public Trust boundaries or jurisdiction. Public Trust issues will be discussed in the staff report.

Also see, Section 1.3a, "Implementation" which clarifies the County's vs. the responsible and trustee agencies (State Lands Commission) authority to implement, enforce and monitor the recommendations in the Proposed Final PEIR.

2-5 Comment noted.

Response: See response to Comment 1-1 regarding project description.

2-6 Comment noted.

Response: See response to Comments 1-4 and 1-5.

2-7 Comment accepted.

Response: See response to Comments 1-4 and 1-5.

2-8 Comment noted.

Response: See response to Comments 1-4, 1-5, 1-11 and 1-16.

2-9 Comment noted.

Response: The mitigation measure referred to in this comment, Fish-4c, has been deleted from the Proposed Final PEIR. See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR. See also, response to comment 11-11.

2-10 Comment noted.

Response: See response to Comments 1-14, 2-9, and Proposed Final PEIR, p. 58.

As discussed in PEIR Section 5.5, the Mad River Fish Hatchery raises and releases yearling chinook salmon, yearling coho salmon, and yearling steelhead trout.

2-11 Comment noted.

Response: See response to Comment 1-15.

Comment Letter No. 3

Person, Organization or Public Agency making comment

Sierra Club
Redwood Chapter, North Group
Susie Van Kirk, Conservation Chair
P. O. Box 238
Arcata, CA 95521

Comment Identification Number	Response

3-1 **Comment accepted.**

Response: See response to Comments 1-4 and 1-5.

3-2 **Comment noted.**

Response: See response to Comments 1-4, 1-5 and 1-11.

Extraction should not be limited to 100,000 cubic yards per year, which is a preliminary estimate. The volume of material extracted should be modified based on environmental and riverine conditions, and extraction methods should be subject to modification based on data gathered thorough the monitoring program outlined in the ARMP, Attachment 1. See Jager report, Attachment 2.

3-3 **Comment noted.**

Response: See response to Comments 1-1, 1-4 and 1-5.

Also see, Section 1.3a, "Implementation" which clarifies the County's vs. the responsible and trustee agencies authority to implement, enforce and monitor the recommendations in the Proposed Final PEIR.

3-4 **Comment noted.**

Response: See response to Comment 3-3.

3-5 **Comment does not raise a significant environmental point.**

Response: The comment relates to the MOA and does not address the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

Comment Letter No. 4

Person, Organization or Public Agency making comment

Trinity Associates
Aldaron Laird, Natural Resources Planner

Comment Identification Number	Response
4-1	**Comment noted.** Response: See response to Comment 1-1.
4-2	**Comment noted.** Response: See response to Comment 1-1, 1-4 and 1-5.
4-3	**Comment noted.** Response: See response to Comment 1-16 and PEIR Sections 1.3 and 1.5. "Bank to Bank" means the area within the normal high flow channel. The impacts resulting from surface mining on the entire Mad River have been identified and are included within the PEIR Sections 5.0 et al. Based on conversations with the Department of Fish and Game and the Planning and Public Works Departments for the Counties of Trinity and Mendocino, no significant surface mining occurs on the Mad River above the Mad River Fish Hatchery, or below the Highway 101 bridge.
4-4	**Comment noted.** Response: See response to Comments 1-4, 1-5, 1-11 and 1-31, and Proposed Final PEIR Sections 6.0 through 6.5.
4-5	**Comment noted.** Response: See response to Comment 1-4 and 1-5.
4-6	**Comment does not raise a significant environmental point.** Response: See response to Comment 2-4.

4-7 Comment noted.

Response: See response to Comments 1-4 and 1-5.

4-8 Comment noted.

Response: See response to Comment 1-4, 1-5 and 1-11.

4-9 Comment does not raise a significant environmental point.

Response: The comment is informative and does not address the adequacy of the PEIR, therefore pursuant to CAC Section 15088 and 15132, no response required.

4-10 Comment noted.

Response: See response to Comment 1-4, 1-5 and 1-11.

4-11 Comment noted.

Response: See response to Comment 1-5.

The comment misinterprets the PEIR. As stated in Section 6.1, Alternative 3 - Moratorium - No Extraction "This alternative proposes that the Board of Supervisors approve an ordinance that creates a moratorium prohibiting gravel extraction along the Mad River. Pursuant to the CEQA Guidelines, Section 15126(d)(2) the specific alternative of 'no project' must be evaluated. The ***intent*** (emphasis added) of the 'no project' alternative is to determine the potential significant effects, should the project not be implemented or developed."

It continues "Because in this case, the 'project' is the on-going extraction of sand and gravel from the Mad River, and because 8 of the 10 sites covered under the EIR already have authorization to extract material, ***arguably*** (emphasis added) the 'no project' alternative is the continued extraction of sand and gravel from these authorized sites. In order to meet the intent of CEQA, this alternative can be considered the 'no project' alternative."

Because Public Resources Code Section 2776 granted vested rights to 6 of the 10 operations, state and county law would need to be amended to halt all gravel extraction on the Mad River. This relates to changes in law and is not an environmental issue.

4-12 Comment noted.

Response: Terrace mining does not occur in Humboldt County, it is acknowledged that such mining occurs elsewhere in the state. The issues raised in Sonoma County regarding terrace mining are an indication to Humboldt County that terrace mining can result in significant impacts. The soils, land uses and political structure is different and unique in Humboldt County. It is

not safe to assume that since terrace mining occurs elsewhere in the state that it can also occur in Humboldt County, or that impacts resulting from terrace mining are similar. We believe potential impacts resulting from terrace mining in Humboldt County requires considerable forecasting and speculation.

4-13 Comment noted.

Response: See Section 6.0 through 6.5.

Section 6.3 acknowledges that the environmentally superior alternative is Number 3 - the moratorium. CEQA does not require that the environmentally superior alternative be the recommended or preferred alternative.

4-14 Comment noted.

Response: See Proposed Final PEIR Section 6.0 through 6.5 and the response to Comments 1-11, 4-11 and 4-12.

Comment Letter No. 5

Person, Organization or Public Agency making comment

Dun & Martinek
William O. Davis
730 Seventh Street, Suite B
Eureka, CA 95501

Comment Identification Number	Response

5-1 **Comment accepted.**

Response: As stated in Appendix B, G. Mathias Kondolf Consultant Report, the complexity of sediment transport and channel change in natural rivers is such that prediction of river behavior is plagued with a significant degree of uncertainty. Further, Appendix B states:

(p. 15)

> "The processes of bedload sediment transport in streams are still poorly understood. This is due, in large part, because it is generally not possible to observe the processes of bedload sediment transport directly, at least during times of greatest sediment transport. There is still basic disagreement among investigators about what goes on in streams during sediment transport...One reason sediment transport is so difficult to understand is the tremendous spatial and temporal variability in the processes of sediment production from the watershed, sediment delivery to the channel, transportation within the channel., and deposition in and along the channel."

CAC Section 15145 states that if a "particular impact is too speculative for evaluation, the [lead] agency should note its conclusion and terminate discussion of the impact."

The reports and studies prepared by our consultants are based on the best available data and information. Due to the complexity and speculative nature of studying and quantifying bedload sediment transport and CAC Section 15145, no further studies are proposed. It is understood that some discrepancies or disagreements will occur.

However, regardless of the transport rate, it is agreed by qualified individuals that continued bed degradation on the Mad River will result in significant impacts to biologic, fisheries and vegetative species and habitats, and to public utilities and structures.

The ARMP proposes recommended mitigation measures that will reduce the potential for significant impacts. See also the response to Comments 1-4 and 1-5.

5-2 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required. See also Attachment 3.

5-3 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comment 5-1, and Attachments 1 and 3.

5-4 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comment 5-1, Attachments 1 and 3, and PEIR Section 5.12.

5-5 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comment 5-1, and Attachments 1 and 3.

5-6 Comment does not raise a significant environmental point.

Response: The comment suggests further studies which are outside the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.. The implementation of the ARMP and the recommended mitigation measures will reduce the potential impacts to the water district structures.

See also response to Comments 1-4, 1-5, and 5-1.

5-7 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comment 5-1, Attachments 1 and 3, and PEIR Section 5.12.

5-8 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comments 1-4, 1-5 and 5-1, and Attachments 1 and 3.

5-9 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comments 1-4, 1-5 and 5-1, Attachments 1 and 3, and PEIR Section 5.12.

5-10 Comment does not raise a significant environmental point.

Response: The comment provides anecdotal information and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

See also response to Comment 5-1, and PEIR Sections 5.2 and 5.12.

5-11 Comment does not raise a significant environmental point.

Response: The modification of state law is beyond the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

5-12 Comment does not raise a significant environmental point.

Response: See response to Comment 1-16. Impacts resulting from water release from Ruth Dam are outside the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

5-13 Comment does not raise a significant environmental point.

Response: See response to Comment 1-16. The comment proposes studies that are outside the scope of this PEIR and which do not address the adequacy

of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

5-14 Comment noted.

Response: For discussion of the importance of full or successive stage vegetative habitat, see Attachment 3, Appendix D, Mad River Biologist Consultant Report, pages 2-5 and Appendix H, Karen Theiss & Associates Consultant Report, pages 2-7.

5-15 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue, therefore pursuant to CAC Sections 15088 and 15132, no response required. There is no discussion or recommendation in the PEIR or ARMP that summer flat car bridges be raised to a level that allows navigation. See also PEIR Section 5.14.

5-16 Comment does not raise a significant environmental point.

Response: The comment discusses economics which is not a significant environmental issue or the adequacy of the PIER, therefore pursuant to CAC Sections 15088 and 15132, no response required. See also response to Comment 2-4.

5-17 Comment noted.

Response: See response to Comment 1-1.

5-18 Comment noted.

Response: See response to Comments 1-4 and 1-5.

5-19 Comment noted.

Response: See response to Comments 1-1, 1-4, 1-5 and 1-11.

5-20 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore pursuant to CAC Sections 15088 and 15132, no response required.

5-21 Comment accepted.

Response: See response to Comments 1-4, 1-5 and 1-11.

Comment Letter No. 6

Person, Organization or Public Agency making comment

Bruce Hunner
Box 1011
Arcata, CA 95521

Comment Identification Number	Response

6-1 **Comment does not raise a significant environmental point.**

Response: This comment proposes changes to adopted County policy documents which is outside the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

6-2 **Comment accepted.**

Response: See response to Comment 1-4 and 1-5.

The Conditional Use Permit issued to Eureka Sand & Gravel (Site No. 4) specifies hours of operation limited to 7:30 a.m. to 6:00 p.m. Operations occurring before 7:30 a.m. or after 6:00 p.m. are a violation of the approved Conditional Use Permit. The approved Conditional Use Permit makes no restrictions on the days of the week when operations are allowed, or prohibited.

Comment Letter No. 7

Person, Organization or Public Agency making comment

David S. Krueger, Attorney
P.O. Box 649
Arcata, CA 95521

Comment Identification Number	Response

7-1 **Comment does not raise a significant environmental point.**

Response: The comment does not address a significant environmental issue or address the adequacy of the PIER, therefore pursuant to CAC Sections 15088 and 15132, no response required.

The commentor feels that sufficient time was not available for comment on the Draft PEIR. The Draft PEIR was circulated for a period of 60 days, CAC Section 15087 requires at least 45 days. In addition, the Proposed Final PEIR will be recirculated for an additional 45 days.

7-2 **Comment noted.**

Response: See response to Comments 1-4, 1-5, 1-16, 1-23, 1-31, 3-2 and 5-1.

The most (and least) appropriate locations for gravel mining will undoubtedly change from year to year. It is not possible or appropriate, and much too speculative to identify such locations in the PEIR. The ARMP, however, describes standards and procedures for determining, annually, the "appropriate" locations for surface mining.

The impacts on vegetation resulting from surface mining are described in PEIR Section 5.7, and Appendices D and H.

Visual impacts resulting from surface mining are described in PEIR Section 5.9 and Appendix E.

The purpose of the ARMP is described in PEIR Sections 1.3 and 1.4.

7-3 **Comment noted.**

Response: See response to Comments 1-3, 1-4, 1-5, and 1-16.

7-4 Comment does not raise a significant environmental point.

Response: The modification of county and state laws and policy is beyond the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

In order to make the suggested changes would require modifications to the state adopted Surface Mining and Reclamation Act (SMARA). The County only applied SMARA in recognizing vested rights.

7-5 Comment noted.

Response: See response to Comment 1-1.

7-6 Comment noted.

Response: See response to Comments 1-4 and 1-5.

7-7 Comment noted.

Response: See response to Comments 1-5 and 1-16.

7-8 Comment noted.

Response: See response to Comments 1-4, 1-5 and 7-2.

Because of the wide fluctuations in environmental conditionals that can occur annually, it is not possible to provide site specific mitigation. The broad based mitigation proposed will provide a means of determining if each individual site complies with the program and is therefore not a significant impact on the environment.

7-9 Comment noted.

Response: See response to Comments 1-4, 1-5, and 1-24.

Viewshed impacts are identified in PEIR, Sections 5.9 and 5.14. As stated in Section 5.9, the significance of a particular viewshed is based on the perception of the viewer, there can and often is, debate over the significance of a single view or object. To make this point, what may be considered art by some is considered junk by others.

The ARMP proposes recommended standards and mitigation to reduce potential impacts to viewsheds resulting from surface mining.

7-10 Comment noted.

Response: See response to Comments 1-4, 1-5 and 7-2.

Also see PEIR Section 5.9 and Appendices D & H.

7-11 Comment noted.

Response: See response to Comments 1-4, 1-5, 1-16 and 7-2.

Also see PEIR Section 5.9 and Appendices D & H.

7-12 Comment noted.

Response: See response to Comment 1-9.

The Appendices are a part of the PEIR and are incorporated by reference.

7-13 Comment noted.

Response: See response to Comments 1-4, 1-5, 1-16 and 7-2.

7-14 Comment noted.

Response: See response to Comment 1-9.

The Appendices are a part of the PEIR and are incorporated by reference.

7-15 Comment noted.

Response: See response to Comments 1-5.

See also PEIR Section 1.3a, Implementation.

7-16 Comment noted.

Response: Mitigation Measure Morph-3b, which requires the preparation of a revegetation plan, has been deleted from the Proposed Final PEIR.

7-17 Comment noted.

Response: See PEIR Section 5.2 and Appendix F.

7-18 Comment noted.

Response: See response to Comment 1-11.

7-19 Comment noted.

Response: See response to Comment 1-16.

7-20 Comment noted.

Response: See response to Comment 1-11, 1-16.

See also, Proposed Final PEIR, Section 6.0 through 6.5.

7-21 Comment noted.

Response: See PEIR Section 2.2, Areas of Controversy.

Comment Letter No. 8

Person, Organization or Public Agency making comment

Humboldt Bay Municipal Water District
Royal E. McCarthy, President, Board of Directors
828 Seventh Street
P.O. Box 95
Eureka, CA 95501

Comment Identification Number	Response

8-1 **Comment does not raise a significant environmental point.**

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified to read:

(p.1, par. 1)

> "This EIR is a Program EIR (PEIR) pursuant to Section 15168 of the CEQA Guidelines and will evaluate the cumulative impacts of gravel extraction operations on the natural resources, public utilities and structures in and along ~~of~~ the lower Mad River."

(p. 30, par. 2)

> "The recommended alternative will guarantee that: future extraction operations will be conducted to minimize impacts to migrating anadromous fish, and public utilities and structures; ..."

8-2 **Comment accepted.**

Response: See response to Comments 1-4 and 1-5.

8-3 **Comment noted.**

Response: See response to Comments 1-4, 1-5, 2-2, 9-2, 14-4 and 15-9.

We concur that Mitigation Measure Morph-1b is not appropriate and have deleted it from the Proposed Final PEIR.

In addition, the following mitigation measures which refer to Mitigation Measure Morph-1b and require replacement of structures, have been deleted from the Proposed Final PEIR:

Morph-1b	PU&S-2c	PU&S-3b

PU&S-4b	PU&S-5b	PU&S-7b
PU&S-16b	PU&S-18b	

See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

8-4 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. See response to Comment 8-5.

8-5 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified to read:

(p. 143, par. 7)

"In this reach the District has five Ranney Wells, and one ~~Ranney Well collector a~~ surface ~~water~~ diversion structure, two underwater pipe crossings and various instream structures..."

8-6 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified to read:

(p. 43, par. 6)

"Ruth reservoir, located about 68 miles upstream has been storing and distributing Mad River flow since July 1961. Ruth reservoir has a capacity of 48,030~~51,800~~ acre feet. At Ruth Dam the required minimum flow released to the river is 5 cfs. Below Essex the HBMWD must at least maintain the natural flow or the flows outlined below, whichever is less:~~of the river and not let the flow drop below the following schedule:~~..."

8-7 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified to read:

(p. 54, par. 4)

"The restricted volume of alluvium reduces the groundwater storage capacity in the gorge. In 1962, the HBMWD installed threefive Ranney-type wells in this reach. Two additional Ranney wells were installed in 1965 as part of an overall system expansion. The wells tap mainly river water that is pulled down into the riverbed alluvium by pumping. The relatively rapid increase in well-water turbidity during winter storms shows that this connection between surface water and groundwater is quite efficient. Some of these wells penetrate the river bed alluvium to depths of 90100 feet and have perforated radial intake pipes located 50 to 8090 feet below the riverbed."

8-8 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified to read:

(p. 49, par. 6)

"The HBMWD has considered tapping this aquifer as a supplemental water supply; and one of their initial studies preliminary concludes indicate that, with properappropriate river management, including conjunctive use, to control the level of the water table, this aquifer could supply up to 20 MGD (Willis and Chu, 1981)."

Comment Letter No. 9

Person, Organization or Public Agency making comment

City of Blue Lake
Richard S. Platz, City Attorney
241 Railroad Avenue
P.O. Box 797
Blue Lake CA 95525

Comment Identification Number	Response

9-1 **Comment does not raise a significant environmental point.**

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.

See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

9-2 **Comment noted.**

Response: See response to Comment 2-2, 8-3, 14-4 and 15-9.

Mitigation Measure Morph-1b has been deleted it from the Proposed Final PEIR. See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

9-3 **Comment does not raise a significant environmental point.**

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.

See Appendices C and F.

9-4 **Comment accepted.**

Response: We concur that Mitigation Measure Traffic-1a is not appropriate and it has been deleted from the Proposed Final PEIR. See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

9-5 Comment accepted.

Response: We concur that Mitigation Measure Traffic-1c is not appropriate and it has been deleted from the Proposed Final PEIR. See Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

9-6 Comment noted.

Response: See Proposed Final PEIR, Section 6.5, Recommended Mitigation Measure No. 15:

> "All operational truck traffic shall comply with posted speed limits on all roads."

9-7 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.

Comment Letter No. 10

Person, Organization or Public Agency making comment

North Coast Railroad Authority
Stephen F. Crook, Acting Executive Director
P.O. Box 8044
Eureka, CA 95502

Comment Identification Number	Response
10-1	**Comment does not raise a significant environmental point.** The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.
10-2	**Comment accepted.** Response: See response to Comments 1-4 and 1-5.

Comment Letter No. 11

Person, Organization or Public Agency making comment

State of California
Department of Fish and Game
Richard L. Elliott, Regional Manager
601 Locust Street
Redding, CA 96001

Comment Identification Number	Response
11-1	**Comment noted.** Response: See response to Comments 1-4 and 1-5.
11-2	**Comment noted.** Response: See response to Comments 1-4, 1-5 and 7-8.
11-3	**Comment noted.** Response: See response to Comment 1-5. See also, Proposed Final PEIR, Section 1.3a, Implementation.
11-4	**Comment does not raise a significant environmental point.** The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.
11-5	**Comment noted.** Response: See response to Comments 1-4 and 1-5.
11-6	**Comment noted.** Response: See response to Comments 1-4 and 1-5. See also, Proposed Final PEIR, Section 1.3a, Implementation.

11-7 Comment does not raise a significant environmental point.

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore pursuant to CAC Sections 15088 and 15132, no response required. See Proposed Final PEIR, Section 1.3a, Implementation.

The draft reclamation plan found in Appendix J has not been submitted or approved for any specific operations on the Mad River. We also would like to see the existing reclamation plans for operations on the Mad River amended. However, there is no provision of SMARA or Humboldt County Code that allows the County to require the existing approved reclamation plans be amended.

If the operator's choose to amend their reclamation plans then the review of the plans would be subject to CEQA and the provisions of the PEIR and ARMP.

11-8 Comment noted.

Response: See response to Comments 1-4 and 1-5.

11-9 Comment noted.

Response: See response to Comments 1-4 and 1-5.

The PEIR p. 37, par. 3 states

> "The PEIR is not intended to prevent change in the riparian plant community but to ***assure*** (emphasis added) that gravel extraction does not create irreversible adverse impacts on the processes of community succession, nor eliminate representations of specific successional communities."

The following repeated statement in Section 5.7 acknowledges that there are some qualified professionals who believe that the loss, for example, of one area of riparian scrub is insignificant when compared to the total amount of riparian scrub along the Mad River. However, there is a consensus among qualified professionals that, for example, the loss of a large proportion of the total amount of riparian scrub along the Mad River would be a significant impact.

> "There is disagreement among professionals whether the loss of any one habitat area is significant. There is agreement that the cumulative impacts of the loss of a material number of habitat areas is significant. The PEIR takes the conservative approach that the impact could be significant."

We concur that riparian vegetation is an important habitat area and the loss of the successional stage riparian community is a significant impact. Measures for the protection of the riparian community has been included in the ARMP.

11-10 Comment accepted.

Response: See response to Comments 1-3, 1-4 and 1-5.

11-11 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified, see Proposed Final PEIR p. 58, last par.

Mitigation Measure Fish-4c, which requires removal of the waterfall has been deleted from the Proposed Final PEIR.

11-12 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified, see Proposed Final PEIR p. 59a, par. 3.

11-13 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified, see Proposed Final PEIR beginning p. 59a, last par.

11-14 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified, see Proposed Final PEIR p. 59b, last par.

11-15 Comment does not raise a significant environmental point.

Response: The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the suggested text change is reasonable and appropriate and the Proposed Final PEIR has been modified, see Proposed Final PEIR p. 59a, par. 2.

11-16 Comment accepted.

Response: See response to Comments 1-4 and 1-5.

Comment Letter No. 12

Person, Organization or Public Agency making comment

State of California
Regional Water Quality Control Board
North Coast Region
Thomas B. Dunbar, Associate Water Resource Control Engineer
5550 Skyline Blvd., Suite A
Santa Rosa, CA 95403

Comment Identification Number	Response

12-1 **Comment noted.**

Response: Water quality impacts from activities at gravel processing yards is discussed in the PEIR, see p. 32, par. 4. which states:

> "Gravel processing yards generate a considerable amount of fine material from crushing and sorting operations. These fines are collected in sediment settling ponds which are surrounded by a berm, above the 100 year flood plain. Sediment settling ponds are required by the Regional Water Quality Control Board, and as part of the surface mining reclamation plans. The use of settling ponds reduces water quality impacts from processing yard run-off to a level of insignificance."

12-2 **Comment does not raise a significant environmental point.**

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. We agree that water quality impacts from mining activities in the river channel, including installation and removal of summer bridges, are adequately regulated by the CA Department of Fish and Game.

12-3 **Comment accepted.**

Response: The Proposed Final PEIR has been modified to include the new information:

(p. 54, par. 1)

> "When aggradation causes the water table to rise, it can modify existing vegetation patterns, and have an adverse impact on ~~septic tank leach fields and~~ the Blue Lake Sewage Treatment percolation ponds. According to the RWQCB (response to Draft PEIR, dated June 11, 1993) the "result of reduced percolation

capabilities may be wintertime discharge of treated wastewater directly into the Mad River above the HBMWD water supply intakes. The City of Blue Lake may be required to implement an alternative land disposal system. This is a very significant effect. Groundwater elevations at the percolation ponds currently are being monitored by the City of Blue Lake. This information will be helpful in the decision-making process whether to allow the river to aggrade or degrade."

12-4 Comment does not raise a significant environmental point.

Response: This comment reiterates information found in the PEIR, see Section 5.12, and does not address the adequacy of the PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required.

12-5 Comment accepted.

Response: See response to Comments 1-4 and 1-5.

Comment Letter No. 13

Person, Organization or Public Agency making comment

State of California
State Lands Commission
Division of Environmental Planning and Management
Environmental Review Section
Mary Griggs
1807 - 13th Street
Sacramento, CA 95814-7187

Comment Identification Number	Response
13-1	**Comment noted.** Response: See response to Comments 1-4, 1-5 and 1-11. See also Proposed Final PEIR, Sections 6.0 through 6.5.
13-2	**Comment noted.** Response: See response to Comments 1-3, 1-4, 1-5 and 1-16.
13-3	**Comment does not raise a significant environmental point.** Response: Humboldt County Code does not provide a mechanism for "TCR'S". The modification of county codes is beyond the scope of this PEIR, therefore pursuant to CAC Sections 15088 and 15132, no response required. See also, response to Comments 1-11 and 1-31.
13-4	**Comment accepted.** Response: See response to Comments 1-4 and 1-5.

Comment Letter No. 14

Person, Organization or Public Agency making comment

State of California
Department of Transportation
District 1, Transportation Planning Branch
Cheryl S. Willis, Chief
P.O. Box 3700
Eureka, CA 95502-3700

Comment Identification Number	Response

14-1 **Comment noted.**

Response: See response to Comments 1-4 and 1-5. See also, Proposed Final PEIR, Sections 1.3 a, 6.0 through 6.5, Attachment 1 and Attachment 2.

The above cited responses, sections and attachments describe the preferred alternative and the ARMP. The ARMP is being included as Attachment 1 to the Proposed Final PEIR and will be (re)circulated for comment along with the Proposed Final PEIR for a period of 45 days.

See Proposed Final PEIR Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

14-2 **Comment noted.**

Response: See response to Comments 1-4 and 1-5, see also, Proposed Final PEIR, Section 1.3a, Implementation.

14-3 **Comment noted.**

Response: See response to Comment 7-16.

Draft mitigation measure Morph-3b has been deleted. Therefore measure Morph-4b, which refers to Morph-3b, has been deleted. See Proposed Final PEIR Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

14-4 **Comment accepted.**

Response: See response to Comment 2-2, 8-3, 9-2, and 15-9.

Draft mitigation measure Morph-1b has been deleted. See Proposed Final PEIR Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

14-5 Comment noted.

Response: See response to Comment 11-11.

Draft mitigation measure Fish-4c has been deleted. See Proposed Final PEIR Table 2.1a, pages 12a-12d, for a cross reference of the recommended mitigation measures in the Proposed Final PEIR to the mitigation measures in the Draft PEIR.

14-6 Comment noted.

Response: Mitigation Measure Morph-6a implements Mitigation Measure H_20Qlty-3a, which is the requirement for annual review. We understand the concern expressed regarding trenching on the Mad River. However, we are not prepared to eliminate the possibility of trenching in the future, provided that river conditions have changed sufficiently so that trenching can be executed without resulting in significant impacts to biotic, fishery or vegetative species and habitat, and that public utilities and structures are not impacted.

The determination of mining method and location will be determined through the annual review process described in the ARMP.

14-7 Comment accepted.

Response: See response to Comments 9-4 and 9-5.

Mitigation Measures Traffic-1a and Traffic-1c have deleted from the Proposed Final PEIR. The Proposed Final PEIR, Section 6.5, Recommended Mitigation Measures includes Traffic-1b (compliance with speed limits) as recommended mitigation measure no. 15. Caltrans has been deleted as a monitoring agency.

14-8 Comment noted.

Response: See response to Comment 1-1.

Because the project include 8 mining operations that already have entitlement to operate, the project does not involve an increase in traffic on the state highway system. See also, Proposed Final PEIR, Section 1.3a, Implementation, which states in part:

> "Future mining operations, or operations which do not already have County entitlements, will be required, under the Conditions of Approval of the entitlement, to comply with the provisions of the PEIR and ARMP. In this way the County can have regulatory

authority to implement, monitor and enforce the provisions of the PEIR and ARMP over new operations, or operations which do not already have County entitlements."

Review of reclamation plans for these 'future mining operations, or operations which do not already have County entitlements' will be subject to CEQA, and pursuant to PRC Section 2770.5, Caltrans will be have the opportunity to respond.

Comment Letter No. 15

Person, Organization or Public Agency making comment

State of California
Department of Conservation
Division of Mines and Geology
Mined-Land Reclamation Project
Stephen E. Oliva, Acting Environmental Program Coordinator,
Office of Governmental And Environmental Relations

Comment Identification Number	Response

15-1 **Comment accepted.**

Response: See response to Comments 1-4 and 1-5.

15-2 **Comment does not raise a significant environmental point.**

The comment provides additional information and does not address the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the information is valuable and has been added to the Proposed Final PEIR:

(p. 39, par. 2)

"According to the Mined-Land Reclamation Project staff of the Department of Conservation's Division of Mines and Geology (response to Draft PEIR, dated June 11, 1993) the "long term average bedload sediment yield, of 100,000 to 150,000 cubic yards of sand and gravel per year, is a useful parameter to plan extraction activities on the Mad River. A corroborative line of evidence is the in-filling rate for Sweasy [sic] dam. According to Brown (WRI 26-75, 1975), over 2,000 acre-feet of sediment was released from the impoundment at its debouchment in 1970. This yields an average capture rate of about 100,000 cubic yards per year. We have no more specific documentation that describes the extent of filling of Sweasy Dam. However, if the entire storage capacity of Sweasy Dam had been filled with sand and gravel (about 3,000 acre-feet), an average transport figure of 150,000 cubic yards would be demonstrated. These values are in close agreement to the high and low long term averages cited in the Draft PEIR."

15-3 Comment does not raise a significant environmental point.

The comment provides additional information and does not address the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required. However, the information is valuable and has been added to the Proposed Final PEIR:

(p. 38, par. 4)

"Lehre, Klein, and others (Klein, et al. 1993) have compared recruitment estimates with extraction estimates and with changes in channel storage in a budget-like analysis (Gravel Recruitment - Gravel Extraction = Change in Gravel Storage) and the estimates seem to balance fairly well. However, these measurements show that the bed was enlarged by a factor of only about one-half and about one-sixth of the offtake rate (minus the transport rate) in the hatchery to 299 reach and 299 to 101 reach, respectively. The lack of a commensurate response of the bed dimensions to the mined volume seems to indicate that the volume deficit manifested downstream of 101. The enlargement of the Mad River estuary may be a result of this change (from Mined-Land Reclamation Project staff of the Department of Conservation's Division of Mines and Geology, response to Draft PEIR, dated June 11, 1993)."

15-4 Comment noted.

Response: See response to Comments 1-4 and 1-5.

15-5 Comment noted.

Response: See response to Comments 1-4, 1-5 and 14-6.

15-6 Comment noted.

Response: See response to Comments 1-4, 1-5 and 14-6.

15-7 Comment noted.

Response: See response to Comments 1-11, 4-12 and 1-26.

15-8 Comment noted.

Response: See response to Comments 1-4, 1-5, 1-11, 4-12 and 1-26.

15-9 Comment accepted.

Response: See response to Comments 2-2, 8-3, 9-2, and 14-4. This mitigation measure has been deleted.

15-10 Comment noted.

Response: See PEIR page 39, Impact Morph-1, which states:

> "Extraction of bed material in excess of replenishment will cause the riverbed to degrade upstream and downstream of the extraction site. Bed degradation can expose or undermine bridge supports, ***pipe lines*** (emphasis added) and other structures jeopardizing structural integrity. This can cause significant effects."

15-11 Comment noted.

Response: See response to Comments 1-4 and 1-5.

Implementation of the recommended mitigation measures and standards included in the ARMP will reduce the potential significant impacts on Mill Creek. No further study of the concrete sill would be necessary

15-12 Comment accepted.

Response: The PEIR takes the conservative approach, when an impact is not clear, or has the potential to be significant, it was identified as being significant.

15-13 Comment noted.

Response: See response to Comment Letter 8 from the Humboldt Bay Municipal Water District. All appropriate changes suggested by HBMWD were incorporated in the Proposed Final PEIR.

15-14 Comment noted.

Response: See response to Comment 2-9. The mitigation measure requiring removal of fish barriers has been deleted from the Proposed Final PEIR.

15-15 Comment accepted.

Response: The Proposed Final PEIR has been modified to incorporate the suggested change. See also, response to Comments 1-4 and 1-5.

(p16)

> "**Bedload Transport Rate -** An average annual estimate of the amount of material transported to, and through the system."

(p.17)

"**Recruitment -** The total amount of new material that enters the system and is deposited.
Replenishment~~/recruitment~~ - The amount of material replaced or deposited at an individual site.~~The total amount of solid material that is transported by the Mad River annually, during high flows.~~ "

15-16 Comment accepted.

Response: The recommended change has been made to the Proposed Final PEIR. However, due to the number of these changes and because the changes do not affect the content of the PEIR, they have not been shown here.

Comment Letter No. 16

Person, Organization or Public Agency making comment

State of California
Department of Forestry and Fire Protection
Steve Hubbard, Environmental Coordinator
118 South Fortuna Blvd.
Fortuna, CA 95540

Comment Identification Number	Response

16-1 **Comment does not raise a significant environmental point.**

The comment does not address the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.

Comment Letter No. 17

Person, Organization or Public Agency making comment

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Wayne S. White, Field Supervisor
2800 Cottage Way, Room E-1803
Sacramento, CA 95825-1846

Comment Identification Number	Response

17-1 **Comment does not raise a significant environmental point.**

The comment does not address a significant environmental issue or the adequacy of the PIER, therefore, pursuant to CAC Sections 15088 and 15132, no response required.

17-2 **Comment noted.**

Response: See response to Comment 1-3, 1-4 and 1-5.

See also, Attachment 3, PEIR Section 5.6, p. 73 and Appendix D, p. 13. The PEIR states "None of the present gravel mining operations would impact Spotted Owls in adjacent suitable habitat." However, recommended mitigation for the protection of fish and wildlife species and habitat is included in the ARMP.

17-3 **Comment noted.**

Response: See response to Comments 1-4 and 1-5.

Attachment 1

Aggregate Resources Management Plan

Aggregate Resources Management Plan

for the

Lower Mad River

Humboldt County, California

September, 1993

Prepared by:

Humboldt County Planning and Building Department
Planning Division
3015 H Street • Eureka, CA • 95501-4484
Phone (707) 445-7541 • FAX (707) 445-7446

Contribution by:

Trinity Associates, Inc.
P. O. Box 820 • Arcata, CA • 95521
(707) 826-2854

Table of Contents

OVERVIEW

This Aggregate Resource Management Plan (ARMP) will make recommendations, that when implemented, will regulate and manage gravel removal and monitor bed elevations of the lower Mad River. The ARMP is based on the preferred alternative and the recommended mitigation measures described in the Final Program Environmental Impact Report on Gravel Removal from the Lower Mad River (PEIR).

The recommendations in this ARMP were developed using the best information and technology available. It is expected that changes in river conditions, technology and the information base generated by the monitoring program, will demand modifications to the ARMP. It is intended that this ARMP be a dynamic plan that is updated as often as necessary to keep up with these changes.

In situations where the ARMP does not provide specific recommendations, the individual site characteristics and most importantly, common sense shall control the use and implementation of this ARMP.

IMPLEMENTATION

As discussed in the PEIR, six of the ten known surface mining operations have vested rights pursuant to Public Resources Code (PRC) Section 2776, two have been issued Conditional Use Permits and two are not permitted by the County. Because these operations already have the necessary entitlements to operate, the County's regulatory authority to implement, monitor and enforce the provisions of the PEIR and this Aggregate Resources Management Plan is very limited.

The County's regulatory authority is restricted to enforcing the Conditions of Approval and/or operational restrictions of each operation's approved reclamation plan and/or Conditional Use Permit. It is possible that for some operations, particularly those which were approved some years ago, that the County will have no regulatory authority to implement, monitor or enforce the recommendations of the PEIR or ARMP. This is because there may be no conditions of Approval or Operational Restrictions that relate to the recommendations of the PEIR and ARMP (i.e. protection of the environment, restrictions on the method or quantity of material to be extracted).

Regulatory authority over these existing operations, for implementation, monitoring and enforcement of the PEIR and ARMP, will automatically default to the state and federal trustee and responsible agencies. These agencies would include, but not be limited to, the California Department of Fish & Game, State Lands Commission, U.S. Fish & Wildlife Service and Army Corps of Engineers.

Future mining operations, or operations which do not already have County entitlements, will be required, under the Conditions of Approval of the entitlement, to comply with the provisions of the PEIR and ARMP. In this way the County can have regulatory authority to implement, monitor and enforce the provisions of the PEIR and ARMP over new operations, or operations which do not already have County entitlements.

PURPOSE

1. To establish goals and objectives for the continued extraction of aggregate from the lower Mad River.
2. To identify mitigation measures that reduce the significant impacts identified in the PEIR to a level of insignificance.
3. To create a monitoring program.

GOALS

1. To mine aggregate resources on the Lower Mad River in a manner which preserves and safeguards the local environment and quality of life.
3. To encourage and support innovative mining techniques which assure an adequate supply of aggregate while reducing environmental impacts.
4. To encourage and support the use of alternative technology which reduces the need for aggregate.
5. To use the reclamation of mining operations as an opportunity to reclaim, restore and/or enhance the environment and habitat of the Mad River.
6. To ensure the joint participation of industry, agencies, and residents or interested parties in a well-defined and consistent regulatory process.
7. To provide for effective and systematic monitoring and reclamation of aggregate mining operations along the Mad River.

OBJECTIVES

1. ***Water Quality***: To reduce adverse water quality impacts that may result from aggregate mining to a level of insignificance.
2. ***Channel Morphology/Gravel Recruitment***: To obtain a degree of dynamic equilibrium between gravel recruitment and gravel extraction, and assure that any adverse impacts on channel morphology or gravel recruitment that may result from aggregate mining, are reduced to a level of insignificance.
3. ***Hydrology***: To assure that aggregate mining does not adversely affect the flow or flood capability of the Mad River.
4. ***Groundwater Recharge and Water Supplies***: To maintain the existing quality of groundwater and water supplies and to assure that any adverse impacts to, or on groundwater that may result from aggregate mining, are reduced to a level of insignificance.
5. ***Fisheries and Habitat***: To safeguard fishery habitat and reduce any adverse impacts on fisheries that may result from aggregate mining to a level of insignificance. To enhance, if possible, the spawning habitat within the Mad River and to assure unobstructed fish migration.
6. ***Wildlife and Habitat***: To protect wildlife and wildlife habitat, and to assure that any adverse impacts on wildlife and wildlife habitat that may result from aggregate mining, are reduced to a level of insignificance.
7. ***Vegetation***: To protect significant or prime vegetation from adverse impacts that may result from aggregate mining.
8. ***Air Quality***: To maintain the superior air quality of the Mad River valley and to assure that any adverse air quality impacts that may result from aggregate mining, are reduced to a level of insignificance
9. ***Viewshed***: To protect the aesthetic quality of the Mad River.

10. ***Traffic***: To assure that aggregate and aggregate products are transported safely, and to reduce deterioration of existing transportation systems resulting from aggregate mining to a level of insignificance.
11. ***Noise***: To reduce, as much as practicable, noise impacts which are caused by aggregate mining operations.
12. ***Public Utilities and Structures***: To regain structural integrity of all structures in and along the Mad River. To assure that no future adverse impacts on public utilities and structures are a result of aggregate mining.
13. ***Archaeological Resources***: To protect sensitive archaeological sites, both known and undiscovered from adverse impacts resulting from aggregate mining operations.
14. ***Recreation***: To assure an enjoyable and safe recreational experience for all users of the river and riverine environment.

MITIGATION MEASURES

For identification and clarity, these mitigation measures have been cross referenced to the corresponding Recommended Mitigation Measures in the Proposed Final PEIR, Section 6.5, and the binomials for the Mitigation Measures in the Draft PEIR.

1. Recommended Mitigation Measure No. 1 ---------- $H_2$0Qlty-2a
   No equipment shall enter the live stream to install or remove summer bridges, without prior notification and approval from the monitoring agency.

2. Recommended Mitigation Measure No. 2 ---------- $H_2$0Qlty-2b
   All summer bridges shall be installed and removed in accordance with the adopted regulations of the monitoring agency/agencies.

3. Recommended Mitigation Measure No. 3 ---------- $H_2$0Qlty-2c
   The operator shall notify the monitoring agency/agencies at least one working day in advance of installation or removal of all summer bridges. The monitoring agency/agencies may have a warden or other qualified person supervise the installation and removal of summer bridges.

4. Recommended Mitigation Measure No. 4 ---------- $H_2$0Qlty-3a
   An annual review of each proposed extraction operation shall be completed the monitoring agency/agencies. The annual review shall evaluate the success of previous extraction prescriptions; monitor the dynamic character of the Mad River, taking into account seasonal flows and gravel replenishment; and restrict the scope, method, type and intensity of annual extraction operations. The annual review is discussed in detain in the ARMP.

5. Recommended Mitigation Measure No. 5 ---------- Morph-1a
   Total extraction volumes on the Mad River in any year shall be no greater than 85% of the three year average annual replenishment rate.

6. Recommended Mitigation Measure No. 6 ---------- Fish-5a
   The timing of summer bridge installation and removal shall be limited to June 1 through September 30 or as otherwise allowed by the California Department of Fish & Game.

7. Recommended Mitigation Measure No. 7 ---------- Fish-5d
Operators may incorporate woody debris and shallow pools at selected sites to enhance summer juvenile habitat during summer bridge installation, if it can be shown by the operator, during annual review, that the use of such materials does not have the potential to cause an adverse environmental impact.

8. Recommended Mitigation Measure No. 8 ---------- Fish-7b
To enhance summer juvenile fish habitat, operators may incorporate into their operations the placement of woody debris, shallow pools and structures that mimic the effects of natural habitat, if it can be shown by the operator, during annual review, that the use of such materials does not have the potential to cause an adverse environmental impact.

9. Recommended Mitigation Measure No. 9 ---------- Wild-1b
No new haul roads shall be constructed through riparian vegetation without first consulting the monitoring agency/agencies. The monitoring agency/agencies shall determine, in consultation with the County Planning Department, if the proposed haul road will impact significant riparian vegetation. If the haul road will significantly effect established riparian vegetation, the haul road shall either be realigned or redesigned.

10. Recommended Mitigation Measure No. 10 ---------- Wild-1c
All gravel stockpiles shall be maintained in such a manner to assure no encroachment into significant wildlife habitat.

11. Recommended Mitigation Measure No. 11 ---------- Wild-3a
All extraction operations shall water non-paved haul roads at least twice a day. In addition all extraction and processing areas shall be watered as required by the North Coast Unified Air Quality Management District, or as necessary to reduce the level of fugitive dust to acceptable air quality standards.

12. Recommended Mitigation Measure No. 12 ---------- Air-2b
A speed limit of 20 m.p.h. shall be observed by all operational traffic on on-site unpaved roads.

13. Recommended Mitigation Measure No. 13 ---------- View-6a
After extraction, all graded slopes shall be rounded and feathered into the existing terrain to avoid an artificially contoured appearance.

14. Recommended Mitigation Measure No. 14 ---------- Traffic-1b
All operational truck traffic shall comply with posted speed limits on all roads.

15. Recommended Mitigation Measure No. 15 ---------- Noise-9a
All operational equipment used on the gravel bar shall have double mufflers installed.

16. Recommended Mitigation Measure No. 16 ---------- Noise-9b
All gravel bar operations shall be limited to the hours of 9:00 a.m. to 5:00 p.m. Monday through Friday, unless specified otherwise in the entitlement or reclamation plan.

17. Recommended Mitigation Measure No. 17 ---------- Arch-1b
If concentrations of archaeological materials are encountered during any operations, all ground-disturbing work in that vicinity shall be halted. Work near the archaeological finds

shall not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action.

18. Recommended Mitigation Measure No. 18 ----------Rec-1a
Prior to any operations involving trenching, a public safety plan, which includes signs posted adjacent to trench areas, shall be prepared by the operator and submitted to the monitoring agency/agencies for review and approval.

19. Recommended Mitigation Measure No. 19 ----------Rec-1b
For all trenching operations, on-site stockpiles adjacent to trenches shall be designed and maintained to facilitate easy egress by humans and animals from trenches.

20. Recommended Mitigation Measure No. 20 ----------Rec-1c
For all trenching operations, one of the long-walls of the trench shall be graded/excavated at such an angle as to facilitate emergency escape by humans and animals from trenches.

21. Recommended Mitigation Measure No. 21 ----------Rec-2a
Prior to placement of any summer bridge crossing, a public safety plan, which includes signs posted warning of summer bridge crossings, shall be prepared by the operator and submitted to the monitoring agency/agencies for review and approval.

22. Prior to any surface mining operations in any given year, all surface mining operators shall be responsible for securing, and complying with, all necessary agreements and/or permits from all appropriate local, state and federal public agencies. These agencies may include, but not be limited to:

- Humboldt County Planning and Building Department
- Humboldt County Public Works Department
- California Department of Fish & Game (CDFG)
- State Lands Commission
- California Coastal Commission
- Regional Water Quality Control Board
- Northcoast Unified Air Quality Management District
- Army Corps of Engineers

MONITORING

Monitoring encompasses the entire bed of the bankfull channel for the Lower Mad River. In years when there is a net gain of gravel recruitment and excavation of instream aggregate occurs, it will be limited to those sites that have experienced gravel replenishment. The amount of aggregate that can be safely excavated each year is some percentage of the net amount gained. This management plan recommends that 10% of the net gain be reserved for the river system, while 90% of the net gain can be extracted.

Determining the appropriate percentage to be excavated is dependent on: the current conditions of the river bed; downstream/off-shore sediment needs; structural safety requirements; and aggregate demand. It is appropriate that these percentages be modified

if, after successive years, it is determined that increased or decreased bed aggradation is required, or appropriate.

Introduction

Natural aggregate, as opposed to man-made aggregate, is a product of weathering. A drainage basin or watershed experiences erosion from physical and chemical weathering processes. Sediments are transported through stream networks from the watershed's upland areas as fine sediments in suspension and as coarse bedload along the river's bed.

Sediments, when not being transported, are stored as alluvium. Common alluvial landscape features are the bed and banks of a river channel, its floodplain, and former floodplains or terraces. Sediments are stored in these features for a greater duration with increasing distance and elevation from the thalweg (the deepest point) of the active channel. In fact, sediments stored as alluvium in older terraces, may date back to earlier geologic epochs. The sediment deposits that make up a valley may not be part of the current or active riverine landscape, none the less they are natural aggregate reserves.

As "new" sediment is brought into areas such as valleys, it is often described as "recruitment" when it is deposited on alluvial features. As newly recruited materials are deposited, they become part of the river's sediment reserves. The sediments stored in a valley or as alluvial reserves are redistributed by the river during high flows. Redistribution of sediment is achieved as a river meanders across the valley, eroding it's bank on the outside of bends and building it's bank on the inside of bends. The process of scouring (degradation) and filling (aggradation) occurs normally every year during high flows when the channel is filled to the top of its banks.

Not all sediments are stored by the river as alluvial features such as bars, floodplains or terraces. The storage capacity of the drainage systems may become filled. High flows may be of such magnitude that sediments transported as bedload do not drop out in storage areas but are carried on through, ultimately, washing into the ocean.

Land use and environmental planning normally involve which are more limited in scope, such as are encountered in subdivisions, property development and zoning. However, to develop a management plan for a riverine system, it is important to expand the environmental planning process to encompass much larger scales, both spatially and temporally, than are normally applied to land use issues.

The concept presented here for the management of instream aggregate extraction takes into account the dynamic nature of riverine systems. The lower Mad River has not always been in its present location, nor has it always exhibited the same form and pattern that it does now. Natural forces and land use practices such as annual floods, catastrophic flood events, droughts, watershed disturbances, vegetative conversions, water impoundment, channelization, and instream mining of aggregate, all have an individual and cumulative effect on the form and pattern of the riverine environment.

The potential for land use conflicts arises when natural resources such as aggregate or water are extracted to such an extent that the natural form and pattern of the river are degraded. Problems are likely to occur when aggregate extraction is greater than aggregate recruitment

by the river. To compound the problem, a river does not deliver the same amount of aggregate or water each year, nor does the river distribute aggregate uniformly throughout.

Aggregate Resource Management

The long term trends in bed elevations for most rivers are unknown. Tracking long term trends in thalweg and bed elevations throughout the length of a reach of river would provide the data to determine if bed lowering is occurring or not.

If more aggregate is removed naturally or artificially from extraction than enters the system, the bed of the river will be lowered. Each year, individual gravel bars may be replenished. However, if an accounting of the total amount of sediment in a system is conducted, more material may have been extracted than deposited as new material. The material extracted must have originated from some source other than recruitment from the upper watershed. The most likely sediment sources are the storage reserves in the river system. During high flows a river re-distributes alluvium that is stored in the bed, bars, banks, floodplain and terraces. The re-distribution of material creates an illusion of recruitment to the system, when in fact, material is only being replenished at individual areas that were scoured naturally or excavated earlier. Eventually, the river's storage reserves can become exhausted by the river's re-distribution and artificial extraction of material. When this occurs, future extraction should be limited to net recruitment deposited in the river system.

To address these processes and issues, the aggregate management concept presented here has two important components: 1) monitor the morphology of the entire bed of the river annually; and, 2) evaluate changes between sequential year's surface morphology. Managing aggregate extraction can be linked to: 1) the recruitment of new material deposited in the system; or, 2) the replenishment of material at specific sites. The implications of adopting either approach are significant to the maintenance of the river's form, pattern and bed elevation.

The approach advocated here is to monitor the entire river bed's surface elevation to determine if there has been a net change annually in surface elevation. If monitoring reveals that more material has been deposited on the river bed than has been removed through natural scour or excavation, then there has been a net gain from recruitment. The river bed would be aggrading in such a situation. However, it is important to note that during any given year there may be site specific replenishment of material, but there may **not** have been a net gain or deposition of new material for the entire river bed. Evaluating changes in surface elevation between successive years for the entire river bed is necessary in order to balance the sediment movement, and determine if recruitment has occurred rather than just replenishment.

Viewing the movement of sediment as an "equation" will assist our understanding of the cause and effect of extracting aggregate to the bed of a river. Importation of new sediments from the upper watershed is treated as recruitment, a river can either store these sediments as alluvial features, or export sediments via natural scour downriver or artificially remove aggregate by extraction. If the amount of recruitment of sediment increases in our equation then, the river has the potential to aggrade. If the volume of stored materials expands as a result of increases in recruitment , then the river has aggraded. If the export of sediment increases

from natural scour, transport or extraction, over and above recruitment levels, then the river has degraded.

In order to maintain the system's form and pattern, the river's alluvial features that make up its bed, bars, banks, floodplain and terraces would need to be kept in a state of dynamic equilibrium. If this is the case, then a river's sediment "budget" would need to be kept in balance. The extraction of aggregate would have to be limited to what is recruited minus what is needed to maintain alluvial features in the river system.

To decide if mining could occur in the active channel within the study area each year, it would be necessary to compare the surface topography from sequential years monitoring:

1. If there was a net reduction in surface topography for the entire river's bankfull bed within the study area, then more material was removed from natural scour or extraction than was recruited, and there would be no mining;

2. If there was no net change in surface topography for the entire river's bankfull bed within the study area, then the same amount of material was removed from natural scour or extraction as was recruited, and there would be no mining;

3. If there is a net increase in surface topography for the entire river's bankfull bed within the study area, then the amount of material removed from natural scour or extraction was less than what was recruited, and mining would be allowed.

In years when there is a net increase in surface elevation for the entire river's bankfull bed, within the study area, excavation of instream aggregate would be limited to those sites that have experienced replenishment.

Recruitment normally would be less than the total of that replenished at all individual sites in the system. Replenishment is affected, not only by sediment supplied as bedload, but by the morphology of the site. Extraction can create a morphology that is conducive to replenishment. Therefore replenishment volume is a function of both site geometry and available bedload rather than just net recruitment.

Monitoring and Assessment

The monitoring methodology and assessment concept discussed below will determine when aggregate can be excavated without causing river bed degradation. Annual monitoring will determine the levels and volume of recruitment and identify areas of replenishment.

The monitoring program requires that aerial surveys be conducted each year when high flows recede in the spring. The aerial survey shall include the entire bed of the river's bankfull channel, within the study area, to determine changes to morphology and surface topography. These surveys will be used to generate a Digital Terrain Model (DTM). The DTM will be based on photogrammetry from controlled aerial photography and ground based methods that utilize a Total Station. Aerial photography can economically survey extensive areas above water, in the normal course of producing current photographs. Field surveys in the wetted channel, utilizing a Total Station will map the thalweg and river bed morphology. Each year these surveys will produce current aerial photographs, topographic maps, and cross sections.

Documenting and evaluating channel response to mining and reclamation designs will be possible using this monitoring program. From sequential DTM's comparative cross sections and longitudinal profiles that portray changes in elevation, channel capacity and slope can be generated.

Annual monitoring will provide aerial photographic bases with mylar overlays to portray current contours, thalweg location, delineation of channel and alluvial features, vegetative communities, and areas of replenishment. Cross sections and longitudinal profiles containing the previous year and current conditions would be generated. Aerial photographic interpretation, AutoCAD mapping and DTM will document changes to thalweg location, channel and bar patterns, vegetative communities, and excavation areas. Sequential DTM's depicting the previous and current years surface topography for the entire river bed will be used to calculate net recruitment. Volumetric calculations will determine the volume of recruitment and replenishment for the entire area. Isopach plots or cut and fill contour maps will identify the location, and area of replenishment. The cut and fill contour map would portray cut elevations in one color, no change in black and fill elevations in another color.

As the data base builds with successive years of surveys, tracking of long term trends in the form and pattern of the river will be possible. Based on the long term trends it may be necessary to modify the percentage allotments (to the river and for extraction) of net recruitment.

DETERMINING ANNUAL NET RECRUITMENT AND SPECIFIC EXTRACTION LOCATIONS

Determining Net Recruitment

Aerial surveys shall be conducted each year when high flows recede in the spring. The entire bed of the river's bankfull channel, within the study area, will be surveyed to determine changes to morphology and surface topography. Field surveys describing the wetted channel, utilizing a Total Station will map the thalweg and river bed morphology. These surveys will be used to generate a Digital Terrain Model (DTM). The DTM will be based on photogrammetry from controlled aerial photography and ground based methods that utilize a Total Station.

Surface elevations thus generated would be tied to the National Geodetic Vertical Datum (NGVD, mean sea level) and California Coordinate System. Monuments and ground control elevations would also be tied into the NGVD, and location coordinates correspond to the California Coordinate System.

The DTM will produce topographic maps that would meet National Map Accuracy Standards for 1"=100' scale with 2' contour interval. Generally, horizontal accuracy should be 1/100 of plot scale (+/- 1 ft. at 100 scale) and spot elevations to 1/4 of contour interval (+/- 0.5 ft at a 2 ft. contour interval). Any number of cross sections can be generated at any location covered by the DTM, as well as provide the ability to re-orient cross sections for future DTM comparisons to account for changing channel configurations.

Sequential DTM's depicting the previous and current years surface topography for the entire river bed, within the study area, will be used to calculate net recruitment. Volumetric calculations are based on the net change in surface elevation for the entire study area. Ninety

percent of the total annual net volume or recruitment is the amount of material that will be available for extraction.

Determining Specific Extraction Locations

Isopach plots, or cut and fill contour maps, used in the volumetric calculations identify the specific locations of replenishment. The cut and fill contour maps portray cut elevations (scour) in one color, no change in black and fill elevations (replenishment) in another color.

The allocation of the available material for extraction (90% of net gain, or recruitment) will be limited to:

1. those sites identified on the cut and fill contour maps as fill (replenishment) areas; and

2. those sites also having the necessary entitlements, permits and/or agreements.

The distribution of the available material for extraction will be decided by those operators whose sites described above.

Once the areas of fill have been identified, and the distribution of available material for extraction has been determined, the operators affected will submit to CDFG a mining plan that includes aerial photographs, topographic maps, and/or cross sections as required in the standards developed by CDFG Region 1 for Fish and Game Code 1603 agreements. The annual mining plan for each operation is also subject to the objectives and mitigation measures included herein, and the standards and conditions of the entitlements and approved reclamation plans.

Attachment A
to the ARMP

Mad River
Instream Aggregate Resource Management
Concept Paper for
Environmental Monitoring and Assessment
prepared by
Trinity Associates
September, 1993

MAD RIVER

INSTREAM AGGREGATE RESOURCE MANAGEMENT

CONCEPT PAPER
for
ENVIRONMENTAL MONITORING AND ASSESSMENT

Prepared for

HUMBOLDT COUNTY PLANNING AND BUILDING DEPARTMENT
PLANNING DIVISION

PROGRAM ENVIRONMENTAL IMPACT REPORT
on
GRAVEL REMOVAL FROM THE LOWER MAD RIVER

SCH 92083049

Prepared by

TRINITY ASSOCIATES

September, 1993

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The intent of this paper is to present an alternative to managing instream mining based upon predictive models of bedload transport rates. Presented here, is an empirical approach to gathering objective data of river conditions for use by decision makers in regulating instream mining, a monitoring methodology and assessment concept to determine when aggregate can be excavated without causing river bed degradation. Monitoring encompasses the entire bed of the bankfull channel for the Lower Mad River. For purposes of this paper, it is assumed that, in years when excavation of instream aggregate occurs, it would be limited to those sites that have experienced gravel replenishment. The amount of aggregate that can be safely excavated each year is some percentage of the net amount gained. Determining the appropriate percentage to be excavated is dependent upon: the current conditions of the river bed; downstream/off-shore sediment needs; structural safety requirements; and aggregate demand.

1.0 INTRODUCTION

Natural aggregate, as opposed to man-made aggregate, is a product of weathering. A drainage basin or watershed experiences erosion from physical and chemical weathering processes. Sediments are transported through stream networks from the watershed's upland areas as fine sediments in suspension and as coarse bedload along the river's bed.

Sediments, when not being transported, are stored as alluvium. Common alluvial landscape features are the bed and banks of a river channel, its floodplain, and former floodplains or terraces. Sediments are stored in these features for a greater duration with increasing distance and elevation from the thalweg (the deepest point) of the active channel. In fact, sediments stored as alluvium in older terraces, may date back to earlier geologic epochs. The sediment deposits that make up a valley may not be part of the current or active riverine landscape, none the less they are natural aggregate reserves.

As "new" sediment is brought into areas such as valleys, it is often described as "recruitment" when it is deposited on alluvial features. As newly recruited materials are deposited, they become part of the river's sediment reserves. The

sediments stored in a valley or as alluvial reserves are redistributed by the river during high flows. Redistribution of sediment is achieved as a river meanders across the valley, eroding it's bank on the outside of bends and building it's bank on the inside of bends. The process of scouring (degradation) and filling (aggradation) occurs normally every year during high flows when the channel is filled to the top of its banks.

Not all sediments are stored by the river as alluvial features such as bars, floodplains or terraces. The storage capacity of the drainage systems may become filled. High flows may be of such magnitude that sediments transported as bedload do not drop out in storage areas but are carried on through, ultimately, washing into the ocean.

Land use and environmental planning normally involves easily understood project opportunities and constraints, such as are encountered in subdivisions, property development and zoning. However, to develop a management plan for a riverine system, it is important to expand the environmental planning process to encompass much larger scales, both spatially and temporally, than are normally applied to land use issues.

The concept presented here for the management of instream aggregate extraction takes into account the dynamic nature of riverine systems. The lower Mad River has not always been in its present location, nor has it always exhibited the same form and pattern that it does now. Natural forces and land use practices such as annual floods, catastrophic flood events, droughts, watershed disturbances, vegetative conversions, water impoundment, channelization, and instream mining of aggregate, all have an individual and cumulative effect on the form and pattern of the riverine environment.

The lower Mad River is naturally composed of alluvial features that form its bed: bars, banks, floodplain and terraces throughout the Blue Lake valley and bottoms. Recently, accelerated rate of aggregate extraction of aggregate has artificially affected the form and pattern of the lower Mad River.

The potential for land use conflicts arises when natural resources such as aggregate or water are extracted to such an extent that the natural form and pattern of the river are degraded. Problems are likely to occur when aggregate

extraction is greater than aggregate recruitment by the river. To compound the problem, a river does not deliver the same amount of aggregate or water each year, nor does the river distribute aggregate uniformly throughout.

2.0 AGGREGATE RESOURCE MANAGEMENT

The long term trends in bed elevations for most rivers are unknown. Tracking long term trends in thalweg and bed elevations throughout the length of a reach of river would provide the data to determine if bed lowering is occurring or not.

If more aggregate is removed naturally or artificially from extraction than enters the system, the bed of the river will be lowered. Each year, individual gravel bars may be replenished. However, if an accounting of the total amount of sediment in a system is conducted, more material may have been extracted than deposited as new material. The material extracted must have originated from some source other than recruitment from the upper watershed. The most likely sediment sources are the storage reserves in the river system. During high flows a river re-distributes alluvium that is stored in the bed, bars, banks, floodplain and terraces. The re-distribution of material creates an illusion of recruitment to the system, when in fact, material is only being replenished at individual areas that were scoured naturally or excavated earlier. Eventually, the river's storage reserves can become exhausted by the river's re-distribution and artificial extraction of material. When this occurs, future extraction should be limited to net recruitment deposited in the river system.

To address these processes and issues, the aggregate management concept presented here has two important components: 1) monitor the morphology of the entire bed of the river annually; and, 2) evaluate changes between sequential year's surface morphology. Managing aggregate extraction can be linked to: 1) the recruitment of new material deposited in the system; or, 2) the replenishment of material at specific sites. The implications of adopting either approach are significant to the maintenance of the river's form, pattern and bed elevation.

The approach advocated here is to monitor the entire river bed's surface elevation to determine if there has been a net change annually in surface elevation. If monitoring documents that more material has been deposited on the river bed than has been removed through natural scour or excavation, then there has been a

net gain from recruitment. The river bed would be aggrading in such a situation. However, it is important to note that during any given year there may be site specific replenishment of material, but there may **not** have been a net gain or deposition of new material for the entire river bed. Evaluating changes in surface elevation between successive years for the entire river bed is necessary in order to balance the sediment movement, and determine if recruitment has occurred rather than just replenishment.

Viewing the movement of sediment as an "equation" will assist our understanding of the cause and effect of extracting aggregate to the bed of a river. Importation of new sediments from the upper watershed is treated as recruitment, a river can either store these sediments as alluvial features, or export sediments via natural scour downriver or artificially remove aggregate by extraction. If the amount of recruitment of sediment increases in our equation then, the river has the potential to aggrade. If the volume of stored materials expands as a result of increases in recruitment , then the river has aggraded. If the export of sediment increases from natural scour, transport or extraction, over and above recruitment levels, then the river has degraded.

In order to maintain the system's form and pattern, the river's alluvial features that make up its bed, bars, banks, floodplain and terraces would need to be kept in a state of dynamic equilibrium. If this is the case, then a river's sediment "budget" would need to be kept in balance. The extraction of aggregate would have to be limited to what is recruited minus what is needed to maintain alluvial features in the river system.

To decide if mining could occur in the active channel each year, it would be necessary to compare the surface topography from sequential years monitoring:

1) If there was a net reduction in surface elevation for the entire river's bankfull bed, then more material was removed from natural scour or extraction than was recruited, and there would be no mining;

2) If there was no net change in surface elevation for the entire river's bankfull bed, then the same amount of material was removed from natural scour or extraction as was recruited, and there would be no mining;

3) If there is a net increase in surface elevation for the entire river's bankfull bed, then the amount of material removed from natural scour or extraction was less than what was recruited, and mining would be allowed.

Herein, it is assumed that in years when there is a net increase in surface elevation for the entire river's bankfull bed, excavation of instream aggregate would be limited to those sites that have experienced replenishment.

Recruitment normally would be less than the total of that replenished at all individual sites in the system. Replenishment is affected, not only by sediment supplied as bedload, but by the morphology of the site. Extraction can create a morphology that is conducive replenishment. Therefore replenishment volume is a function of both site geometry and available bedload rather than just net recruitment.

To determine how much material can be excavated each year it would be necessary to establish what percentage of the net recruitment is: 1) required for the maintenance of the natural alluvial features and downstream/off-shore process; 2) necessary to supply aggregate demand; and 3) needed to restore bed elevations to protect physical structures such as bridge piers, water supply facilities or levees.

3.0 ENVIRONMENTAL MONITORING AND ASSESSMENT

An alternative to managing instream mining based upon predictive models of bedload transport rates, is the concept of monitoring which utilizes empirical measurements of the riverine landscape. Predictive models of river behavior or supply of sediments are only as good as the data upon which they are based and are limited by their underlying assumptions. Topographic and aerial photographic surveys report the field conditions as they actually exist. An empirical approach to gathering objective data of river conditions for use by decision makers is preferable to predictive models, in regulating instream mining. The monitoring methodology and assessment concept discussed will determine when aggregate can be excavated without causing river bed degradation. Annual monitoring will determine the levels and volume of recruitment and identify areas of replenishment.

The proposed monitoring program entails the conducting of surveys each year when high flows recede in the spring. The entire bed of the river's bankfull channel will be surveyed to determine changes to morphology and surface topography.

These surveys will be used to generate a Digital Terrain Model (DTM). The DTM will be based on photogrammetry from controlled aerial photography and ground based methods that utilize a Total Station. Aerial photography can economically survey extensive areas above water, in the normal course of producing current photographs. Surveys in the wetted channel, utilizing a Total Station will map the thalweg and river bed morphology.

Surface elevations thus generated would be tied to the National Geodetic Vertical Datum (NGVD, mean sea level) and California Coordinate System. Monuments and ground control elevations would also be tied into the NGVD, and location coordinates correspond to the California Coordinate System.

The DTM will produce topographic maps that would meet National Map Accuracy Standards for 1"=100' scale with 2' contour interval. Generally, horizontal accuracy should be 1/100 of plot scale (+/- 1 ft. at 100 scale) and spot elevations to 1/4 of contour interval (+/- 0.5 ft at a 2 ft. contour interval). Any number of cross sections can be generated at any location covered by the DTM, as well as provide the ability to re-orient cross sections for future DTM comparisons to account for changing channel configurations.

Each year these surveys will produce current aerial photographs, topographic maps, and cross sections. Standards for performing surveys have been developed by CDF&G Region 1 for Fish and Game Code 1603 agreements, and by an Inter-agency committee headed by Mines and Geology that has developed a Instream Mining and Monitoring Program as mandated in Article 9 Reclamation Standards, CCR Section 3710(c). These technical standards as developed should govern the manner in which information is presented.

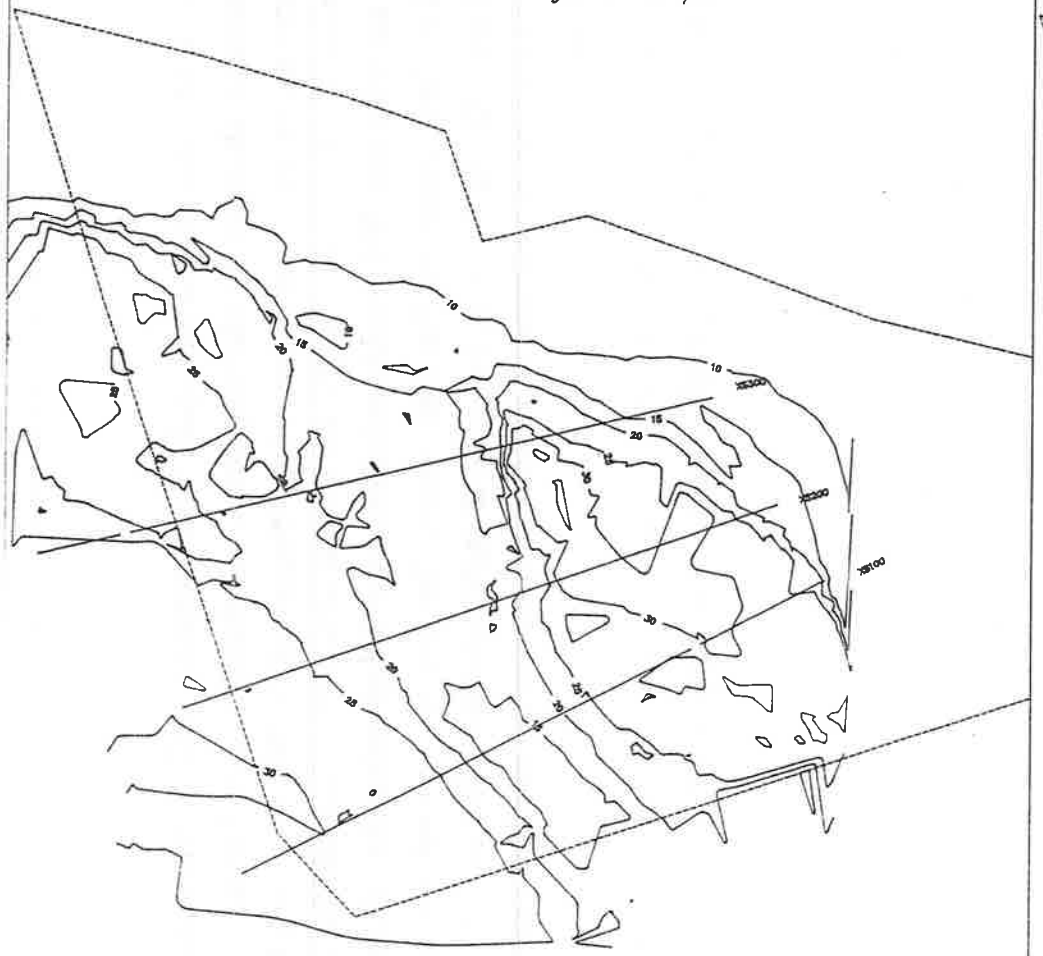
Documenting and evaluating channel response to mining and reclamation designs will be possible using this monitoring program. From sequential DTM's comparative cross sections and longitudinal profiles that portray changes in elevation, channel capacity and slope can be generated.

Annual monitoring will provide aerial photographic bases with mylar overlays to portray current contours, thalweg location, delineation of channel and alluvial features, vegetative communities, and areas of replenishment. Cross sections and longitudinal profiles containing the previous year and current conditions would be

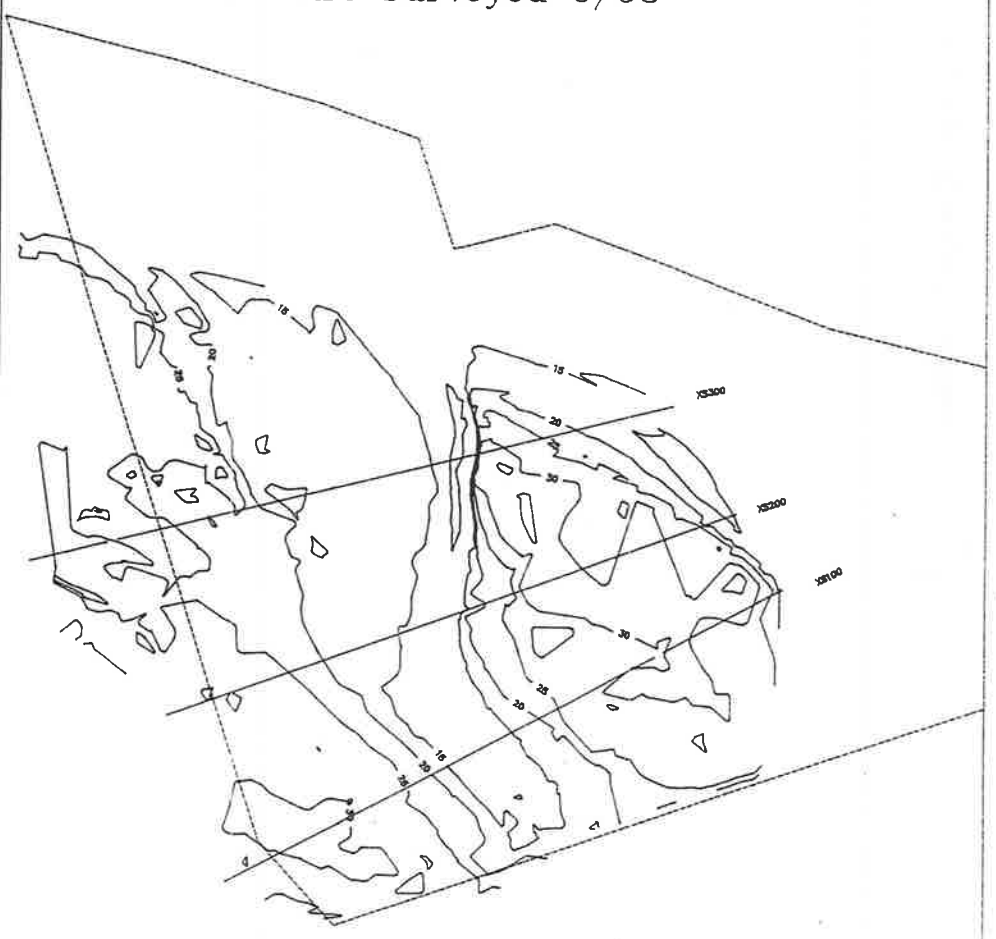
generated. Aerial photographic interpretation, ACAD mapping and DTM will document changes to thalweg location, channel and bar patterns, vegetative communities, and excavation areas. Sequential DTM's depicting the previous and current years surface topography for the entire river bed will be used to calculate net recruitment. Volumetric calculations will determine the volume of recruitment and replenishment for the entire area. Isopach plots or cut and fill contour maps will identify the location, and area of replenishment. The cut and fill contour map would portray cut elevations in one color, no change in black and fill elevations in another color.

As the data base builds with successive years of surveys, tracking of long term trends in the form and pattern of the river will be possible.

Contours surveyed 12/92



Contours surveyed 5/93

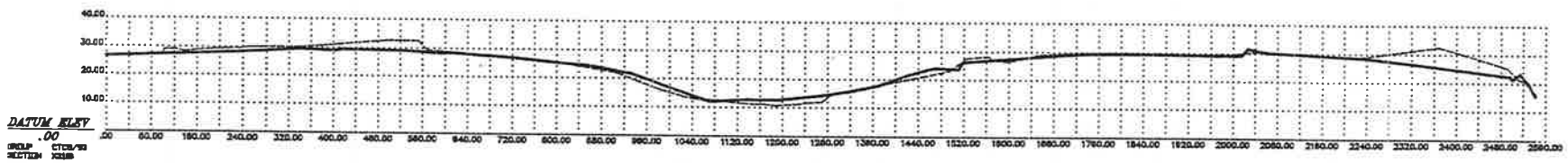


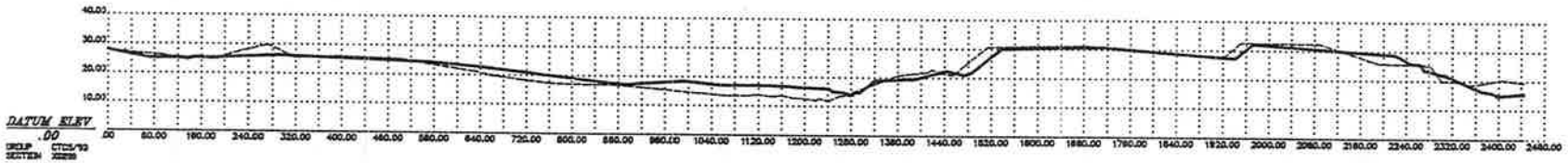
COMPARISON OF SURFACE TOPOGRAPHY

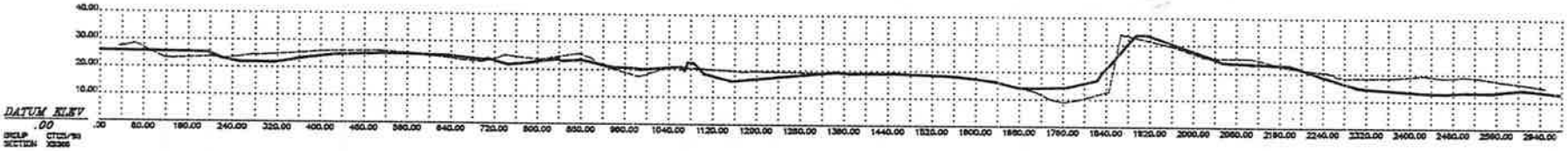
TRINITY RESTORATION ASSOCIATES INC.

CUT AND FILL CONTOURS BETWEEN
12/92 AND 5/93

TRINITY RESTORATION ASSOCIATES INC.







CROSS SECTIONS COMPARING
12/92 (——) AND 5/93 (------)

TRINITY RESTORATION ASSOCIATES INC.

Attachment 2

Lower Mad River Annual Gravel Replenishment and Harvest Models 1962 - 1993

prepared by

Dr. Douglas Jager

July 16, 1993

LOWER MAD RIVER ANNUAL GRAVEL REPLENISHMENT AND HARVEST MODELS 1962-1993

prepared by
Dr. Douglas Jager
July 16, 1993

The purpose of this report is to estimate how various strategies for calculating allowable gravel harvest would have functioned on the lower Mad River during the period between 1962 and 1993. From this review one may be able to select a strategy for calculating future harvests. Klein (1993) estimated annual volumes harvested from the Mad River for the period from 1952 through 1992. Klein's estimates of the 1962 through 1991 harvests are shown below in Table 1. According to Klein the total amount harvested during this 30-year period was approximately 13 million cubic yards providing an average rate of about 430 thousand cubic yards (MCY) per year.

Table 1. - Estimates of Gravel (thousand cubic yards) harvested from Mad River from 1962 through 1991 (Klein, 1993).

Year	Harvest (MCY)	Year	Harvest (MCY)
1962	364	1980	359
1963	662	1981	281
1964	659	1982	253
1965	538	1983	194
1966	587	1984	253
1967	387	1985	327
1968	536	1986	284
1969	549	1987	302
1970	771	1988	293
1971	555	1989	339
1972	553	1990	348
1973	471	1991	268
1974	466		
1975	499	TOTAL	13014
1976	514	AVERAGE	434
1977	506	MAX	771
1978	523	MIN	194
1979	373		

In Appendix F of the 1993 Mad River Draft PEIR Lehre (1993) estimates annual bedload discharge above Blue Lake for the period from 1962 through 1992. The principle component of this analysis is four 1971-1972 bedload transport-discharge relationships cited in Brown (1975). These relationships were obtained downstream of the Sweasey Dam site shortly after the dam was destroyed. This is a very small data set and may not represent conditions found in the

river today. But, it is the best that we have. Another component of Lehre's estimate is the relationship between streamflow at Arcata and streamflow above Blue Lake which allows Blue Lake discharges to be predicted from measurements made at Arcata. This is a very strong relationship and we have confidence in it. Bringing the two components together over time provides a rough estimate of the annual bedload discharge above Blue Lake for the period from 1962 through 1992. Refer to Table 3.3 in Appendix F of the 1993 Mad River Draft PEIR or to Table 2 below. The average annual bedload discharge above Blue Lake during the 1962-1992 period is estimated at 127,000 cubic yards (Table 2, below). Recently, Lehre (personal communication) calculated the average bedload discharge for the North Fork of the Mad River to be about 3,000 cubic yards per year. If we added the average annual bedload discharge above Blue Lake to the average annual bedload discharge of the North Fork of the Mad River and of the other smaller tributaries downstream from Blue Lake we could get a rough estimate of recruitment in the lower Mad River extraction area. We have no estimates of the bedload contributed by these smaller tributaries but their input is presumed to be relatively minor.

Table 2 - Estimated bedload discharge above Blue Lake for the period from 1962 through 1992 from Lehre (1993). MCY = thousand cubic yards.

Year	MCY	Year	MCY
1962	106	1978	180
1963	162	1979	79
1964	126	1980	155
1965	147	1981	79
1966	123	1982	221
1967	136	1983	220
1968	91	1984	191
1969	178	1985	95
1970	114	1986	126
1971	177	1987	83
1972	147	1988	61
1973	121	1989	146
1974	229	1990	89
1975	157	1991	57
1976	96	1992	38
1977	8		
		Average	127

The operators estimate that the 1993 replenishment exceeds 300,000 cubic yards. This is greater than any of the values shown in Table 2. At this time the 1993 replenishment estimates have not been confirmed. The largest estimated annual recruitment in Table 2 is the 1974 229 MCY. For the sake of discussion let's estimate the 1993 Blue Lake bedload discharge to be around 200 MCY. If we add

the 1993 estimate to the above table the 1962 - 1993 average annual estimate of Blue Lake bedload discharge becomes 129 MCY instead of 127 MCY. Now, some operators believe that this figure is too low while other individuals believe it is a reasonable estimate. Lehre (1993) uses other methodologies to estimate the 1962 - 1992 mean annual bedload transport above Blue Lake. See his Table 3.6. Using different methodologies the estimates are 127 MCY, 213 MCY, 249 MCY, 323 MCY, and 419 MCY. We simply do not have the data to completely resolve these differences. Regardless, there is certainly no guarantee that the future average bedload discharge will equal the 1962 - 1993 average bedload discharge. Consequently, if future harvest is to be tied, in some way, to bedload discharge or to replenishment then a monitoring program must be established to determine future replenishment and to track changes in river conditions.

How to Determine Replenishment

Replenishmemnt is the actual sand and gravel that deposited and accumulated in a river reach over a period of time. Annual replenishment can be estimated by comparing spring pre-extraction topographic river-bar surveys with the previous fall post-extraction topographic surveys. The topographic information can be obtained with ground surveys or with special aerial surveys. The surveys can produce cross-sections or topographic maps which are used to generate river-bar volume information. These surveys must be done for all sites where extraction is being proposed. And, it may be desirable to obtain this information for all gravel bars located in the PEIR study reach.

Non-commercial bars could be included when calculating replenishment; but, they need not be. If known, a portion of the replenishment on non-commercial bars can be considered when calculating allowable harvest volumes. However, in a healthy river ecosystem, in the absence of major flooding, extensive aggradation, or extensive degradation the non-commercial bars should remain relatively stable with annual replenishment approximately equal to the volume removed during high water. In time the non-commercial bars in this reach may become relatively stable. Periodic monitoring of these non-commercial bars will be needed to ascertain river morphology condition and trends.

After establishing a replenishment monitoring program one must decide how the annual harvest will be determined from the annual replenishment. There are three questions. First, how much will be harvested? Second, where will it be harvested? Third, how will it be harvested? This paper only addresses the first question.

How Much to Harvest

Let's tackle the first question; how much should be harvested? It is logical to consider replenishment into the upper reaches of the

project area when calculating extraction. If channel aggradation was a problem in the project area, extraction could temporarily exceed replenishment. But, that is not the problem today. Because the river has some degradation problems, particularly in its lower reaches, the average extraction rate must be less than the average replenishment rate. In the past the river has been highly aggraded and it may have been appropriate to harvest more than the average annual replenishment in some years. And, it may be logical to do so again in the future. But, certainly not in the near future.

If gravel harvesting continues and equals or exceeds replenishment the existing degradation problems will worsen. If future harvests are less than replenishment the degradation problems will be reduced. If future harvests are much less than future replenishment, aggradation problems may begin to occur.

So, the present condition of the river dictates that extraction should be less than replenishment. Therefore, monitoring must occur to determine the river condition and to follow trends in aggradation and degradation. Among other things, the monitoring program must determine the following.

1. How much replenishment is taking place?

2. Where is this replenishment occurring?

3. What is the present condition of the river and its related resources?

4. What changes in condition are occurring?

5. Are there any areas where degradation is a problem?

6. Are there any areas where aggradation is a problem?

From this monitoring we can determine, on an annual basis over time, how much riverrun material could be harvested and where the best harvest areas are located.

There are several interim management options to consider when calculating allowable annual harvest. These options should be considered as guidelines which, with justification, can be modified in the future. The option of no harvesting is not presented.

Interim Management Options

1. **Annual harvest equals annual replenishment.** Under this method the amount harvested each year could vary widely and there would be no material reserved for the river. This option must be rejected because there are some downstream reaches where degradation has created problems. Some of the annual upstream

replenishment has to be left in the river to help sustain and improve the downstream degraded reaches. Generally, I have considered reserving 15 percent of the replenishment and harvesting the balance. Over time, while monitoring changes in river condition, the proportion of the replenishment that is reserved for the river can be modified.

2. **Annual harvest equals 0.85 of annual replenishment.** Under this option the amount going to the river and the amount harvested could both vary widely on an annual basis. But some gravel would go to the river every year.

3. **Annual harvest is 0.85 of average annual replenishment.** The average annual replenishment would be recalculated each year. Under this option the amount reserved for the river each year could vary widely while the amount being harvested would be relatively uniform. This method would harvest 85 percent of the long-term average annual replenishment. Harvest rates would be slow to respond to wet and dry cycles. In some years the river would gain gravel and in some years it would lose gravel.

4. **Annual harvest is 0.85 of 5-year average annual replenishment.** Under this option the amount going to the river each year could vary widely while the amount being harvested would be relatively uniform. This method would harvest 85 percent of the 5-year average annual replenishment. A new 5-year average annual replenishment figure would be calculated each year. After 5 years the first year would be dropped from the calculations while the sixth year is added into the calculations. After the seventh year the second year would be dropped while the seventh year is added in, and so on. Compared to Option 3, the amount reserved for the river would vary less and the amount harvested would vary more. The advantage is the harvest would adjust more readily to dry and wet cycles. During most years the river would gain gravel and in some years it would lose gravel.

5. **Annual harvest is 0.85 of 10-year average annual replenishment.** Under this option the amount going to the river each year could vary widely while the amount being harvested would be relatively uniform. This method would harvest 85 percent of the 10-year average annual replenishment. A new 10-year average annual replenishment figure would be calculated each year. After 10 years the first year would be dropped from the calculations while the 11th year is added into the calculations. After the next year the second year would be dropped while the 12th year is added in, and so on. The option would adjust to dry or wet cycles but not as quickly as in option number four. During most years the river would gain gravel and in some years it would lose gravel.

6. **Reserve up to 25,000 cubic yards for the river each year and harvest the rest.** Under this option the river would get some gravel, up to 25,000 cubic yards each year and the industry could harvest the balance, if any. The amount going to the industry would vary widely and the amount going to the river would vary only when the annual replenishment drops below 25,000 cubic yards. Over time, while monitoring changes in river condition the amount that is reserved for the river can be modified.

7. **Harvest 85 percent of the 3-year average annual replenishment and reserve the rest for the river.** Option seven allows the extraction rate to respond fairly quickly to annual changes in replenishment. It seems to provide the most reserved volume for the river while yielding relatively uniform harvest rates. A new 3-year average annual replenishment figure would be calculated each year. After 3 years the first year would be dropped from the calculations while the fourth year is added into the calculations. After the fifth year the second year would be dropped while the fifth year is added in, and so on.

8. **Harvest 125,000 cubic yards or the average annual replenishment whichever is greater. Reserve the rest for the river.** This method produces relatively uniform and high harvests. However the volume reserved for the river is relatively low.

To illustrate these management options let's reevaluate the 1962 - 1993 data. Refer to Table 3 and assume the estimated annual bedload transport discharges are reasonable estimates of replenishment with a 32-year average of 129 MCY. Some people think that estimate is too low. Others may think it is about right. And, I presume that some may think it is too high. Regardless of the average accuracy, most people might accept the annual variability in bed load discharge as reasonable.

For the sake of discussion assume that actual gravel replenishment in the project area is proportional to Lehre's bedload transport above Blue Lake. If so, we can adjust the 1962 - 1993 bedload transport data to obtain a 32-year average relative annual replenishment of 100 MCY (Table 4). Then we can see that the 1977 relative replenishment was much less than average (about six percent of the 32-year average) and that 1966 and 1967 were close to average (about 95 percent and 105 percent, respectively). Table 4 becomes the basis for our relative replenishment-harvest models.

Relative Replenishment/Harvest Models

The eight management options were applied to a 1962 - 1993 relative gravel replenishment/harvest model assuming that:

1. replenishment was proportional to the estimated bedload transport data in Table 3, and

2. the average annual replenishment rate was 100,000 cubic yards (100 MCY).

Because we are not exactly sure what the future average annual replenishment volume will be the models were repeated using average annual replenishment rates of 150 MCY, 200 MCY, and 300 MCY. A summary of the average annual volumes reserved for the river after the 32 year simulated replenishment and harvest is shown in Table 5. A summary of average annual volumes harvested during the 32 year simulated replenishment and harvest model is shown in Table 6. Tables 7 and 8 provide a more detailed summary for average annual replenishment rates of 150,000 and 200,000 cubic yards. The individual simulations follow Table 8.

Pessimists should concentrate on the 100MCY data. Optimists may be interested in the 300MCY data. And, realists may be more interested in the 150MCY and 200MCY data.

Table 3 - Estimated Mad River annual bedload transport above Blue Lake for 1962 - 1993. MCY = thousand cubic yards.[a/]

YEAR	Estimated Annual Bedload Transport (MCY)
1962	106
1963	162
1964	126
1965	147
1966	123
1967	136
1968	91
1969	178
1970	114
1971	177
1972	147
1973	121
1974	229
1975	157
1976	96
1977	8
1978	180
1979	79
1980	155
1981	79
1982	221
1983	220
1984	191
1985	95
1986	126
1987	83
1988	61
1989	146
1990	89
1991	57
1992	39
1993	200
AVERAGE	129
TOTAL	4139

[a/] 1962 - 1992 data from Lehre (1993). 1993 value is rough estimate.

Table 4 - Estimated and adjusted (relative) Mad River annual replenishment near Blue Lake for 1962 - 1993. MCY = thousand cubic yards.

Year	Estimated Annual Replenishment (MCY)	Relative Annual Replenishment (MCY)
1962	106	82
1963	162	126
1964	126	98
1965	147	114
1966	123	95
1967	136	105
1968	91	71
1969	178	138
1970	114	88
1971	177	137
1972	147	114
1973	121	94
1974	229	177
1975	157	122
1976	96	74
1977	8	6
1978	180	140
1979	79	61
1980	155	120
1981	79	61
1982	221	171
1983	220	171
1984	191	148
1985	95	74
1986	126	98
1987	83	64
1988	61	47
1989	146	113
1990	89	69
1991	57	44
1992	39	30
1993	200	155
AVERAGE	129	100
TOTAL	4139	3208

Recommendation

After examining the results I recommend that the three-year floating average (Option 7) be used for near-future harvest calculations. Option 7 seems to reserve the most volume for the river and produces relatively uniform harvest levels.

If Option 7 had been used to calculate allowable harvest rates during the 1962 - 1993 period and if the true average annual replenishment rate was 150,000 cubic yards then the average annual amount saved for the river would have been 24,000 cubic yards (Table 5) and the average annual extraction rate would have been 127,000 cubic yards (Table 6). Klein (1993) estimates that the true average annual extraction rate for this period was around 430,000 cubic yards (Table 1).

Food for Thought

The performance of this method can be examined each year during the annual reclamation plan reviews. During these review processes it may be appropriate to modify or fine tune the methodology.

Table 5. - Summary of Volumes Reserved for River After 32 year Simulation of Replenishment and Harvest.

Theoretical Average Replenishment Rate (MCY/year)	Average annual volume reserved for river (MCY/year) Options 1	2	3	4	5	6	7	8
100	0	15	12	15	13	24	16	-25
150	0	23	18	22	19	24	24	18
200	0	30	24	29	25	24	31	24
300	0	45	36	44	38	24	47	36

Table 6. - Summary of Volumes Harvested After 32 year Simulation of Replenishment and Harvest.

Theoretical Average Replenishment Rate (MCY/year)	Average annual harvest (MCY/year) Options 1	2	3	4	5	6	7	8
100	100	85	88	86	88	76	85	125
150	150	128	132	129	131	126	127	132
200	200	170	176	171	175	176	169	176
300	300	255	264	257	262	276	253	264

Table 7. - Summary of simulated harvest and reserve volumes (thousand cubic yards) for the various options when average annual replenishment is 150,000 cubic yards.

Options	1	2	3	4	5	6	7	8
Average annual volume reserved for river	0	23	18	22	19	24	24	18
Maximum annual volume reserved	0	40	125	128	126	25	135	125
Minimum annual volume reserved	0	1	-122	-111	-121	6	-77	-122
Average annual volume harvested	150	128	132	129	131	126	127	132
Maximum annual volume harvested	266	226	142	171	146	241	208	142
Minimum annual volume harvested	9	8	105	78	105	3	61	105

Table 8. - Summary of simulated harvest and reserve volumes (thousand cubic yards) for the various options when average annual replenishment is 200,000 cubic yards.

Options	1	2	3	4	5	6	7	8
Average annual volume reserved for river	0	30	24	29	25	24	31	24
Maximum annual volume reserved	0	53	167	170	168	25	180	167
Minimum annual volume reserved	0	2	-162	-149	-161	6	-102	-162
Average annual volume harvested	200	170	176	171	175	176	169	176
Maximum annual volume harvested	355	302	190	228	194	330	278	190
Minimum annual volume harvested	12	11	140	103	140	6	81	140

ANALYSIS OF OPTIONS ASSUMING AVERAGE ANNUAL REPLENISHMENT IS 100,000 CUBIC YARDS

Table 1-100.
OPTION 1 - 100,000 CY
Harvest Annual Replenishment Each Year.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISHMENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	0	82	0
1963	162	126	0	126	0
1964	126	98	0	98	0
1965	147	114	0	114	0
1966	123	95	0	95	0
1967	136	105	0	105	0
1968	91	71	0	71	0
1969	178	138	0	138	0
1970	114	88	0	88	0
1971	177	137	0	137	0
1972	147	114	0	114	0
1973	121	94	0	94	0
1974	229	177	0	177	0
1975	157	122	0	122	0
1976	96	74	0	74	0
1977	8	6	0	6	0
1978	180	140	0	140	0
1979	79	61	0	61	0
1980	155	120	0	120	0
1981	79	61	0	61	0
1982	221	171	0	171	0
1983	220	171	0	171	0
1984	191	148	0	148	0
1985	95	74	0	74	0
1986	126	98	0	98	0
1987	83	64	0	64	0
1988	61	47	0	47	0
1989	146	113	0	113	0
1990	89	69	0	69	0
1991	57	44	0	44	0
1992	39	30	0	30	0
1993	200	155	0	155	0
AVERAGE	129	100	0	100	
MAX	229	177	0	177	
MIN	8	6	0	6	
TOTAL	4139	3208	0	3208	

Table 2-100.
OPTION 2 - 100,000 CY
Harvest 85 percent of replenishment each year.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	12	70	12
1963	162	126	19	107	31
1964	126	98	15	83	46
1965	147	114	17	97	63
1966	123	95	14	81	77
1967	136	105	16	90	93
1968	91	71	11	60	104
1969	178	138	21	117	124
1970	114	88	13	75	138
1971	177	137	21	117	158
1972	147	114	17	97	175
1973	121	94	14	80	189
1974	229	177	27	151	216
1975	157	122	18	103	234
1976	96	74	11	63	245
1977	8	6	1	5	246
1978	180	140	21	119	267
1979	79	61	9	52	276
1980	155	120	18	102	294
1981	79	61	9	52	304
1982	221	171	26	146	329
1983	220	171	26	145	355
1984	191	148	22	126	377
1985	95	74	11	63	388
1986	126	98	15	83	403
1987	83	64	10	55	412
1988	61	47	7	40	419
1989	146	113	17	96	436
1990	89	69	10	59	447
1991	57	44	7	38	453
1992	39	30	5	26	458
1993	200	155	23	132	481
AVERAGE	129	100	15	85	
MAX	229	177	27	151	
MIN	8	6	1	5	
TOTAL	4139	3208	481	2727	

Table 3-100.
OPTION 3 - 100,000 CY
Harvest 85 percent of average annual replenishment each year.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	82	70	12	12
1963	162	126	104	88	37	50
1964	126	98	102	87	11	61
1965	147	114	105	89	25	86
1966	123	95	103	87	8	93
1967	136	105	103	88	18	111
1968	91	71	99	84	-13	98
1969	178	138	104	88	50	148
1970	114	88	102	87	2	149
1971	177	137	105	90	48	197
1972	147	114	106	90	24	221
1973	121	94	105	89	4	225
1974	229	177	111	94	83	308
1975	157	122	111	95	27	335
1976	96	74	109	93	-18	317
1977	8	6	103	87	-81	236
1978	180	140	105	89	50	286
1979	79	61	102	87	-26	261
1980	155	120	103	88	32	293
1981	79	61	101	86	-25	268
1982	221	171	105	89	82	351
1983	220	171	108	91	79	430
1984	191	148	109	93	55	485
1985	95	74	108	92	-18	467
1986	126	98	107	91	6	473
1987	83	64	106	90	-26	448
1988	61	47	104	88	-41	407
1989	146	113	104	88	25	432
1990	89	69	103	87	-18	414
1991	57	44	101	86	-41	372
1992	39	30	98	84	-53	319
1993	200	155	100	85	70	388
AVERAGE	129	100	104	88	12	
MAX	229	177	111	95	83	
MIN	8	6	82	70	-81	
TOTAL	4139	3208	3317	2819	388	

Table 4-100.
OPTION 4 - 100,000 CY
Harvest 85 percent of 5-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	5-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	82	70	12	12
1963	162	126	104	88	37	50
1964	126	98	102	87	11	61
1965	147	114	105	89	25	86
1966	123	95	103	87	8	93
1967	136	105	108	91	14	107
1968	91	71	97	82	-12	96
1969	178	138	105	89	49	145
1970	114	88	100	85	4	149
1971	177	137	108	92	45	194
1972	147	114	110	93	21	215
1973	121	94	114	97	-3	212
1974	229	177	122	104	74	285
1975	157	122	129	109	12	297
1976	96	74	116	99	-24	273
1977	8	6	95	80	-74	199
1978	180	140	104	88	51	250
1979	79	61	81	69	-7	243
1980	155	120	80	68	52	294
1981	79	61	78	66	-5	290
1982	221	171	111	94	77	367
1983	220	171	117	99	71	438
1984	191	148	134	114	34	472
1985	95	74	125	106	-33	439
1986	126	98	132	112	-15	425
1987	83	64	111	94	-30	395
1988	61	47	86	73	-26	369
1989	146	113	79	67	46	415
1990	89	69	78	67	2	417
1991	57	44	68	57	-13	404
1992	39	30	61	52	-21	382
1993	200	155	82	70	85	467
AVERAGE	129	100	101	86	15	
MAX	229	177	134	114	85	
MIN	8	6	61	52	-74	
TOTAL	4139	3208	3224	2740	467	

Table 5-100.
OPTION 5 - 100,000 CY
Harvest 85 percent of 10-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	10-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	82	70	12	12
1963	162	126	104	88	37	50
1964	126	98	102	87	11	61
1965	147	114	105	89	25	86
1966	123	95	103	87	8	93
1967	136	105	103	88	18	111
1968	91	71	99	84	-13	98
1969	178	138	104	88	50	148
1970	114	88	102	87	2	149
1971	177	137	105	90	48	197
1972	147	114	109	92	22	219
1973	121	94	105	90	4	223
1974	229	177	113	96	81	304
1975	157	122	114	97	25	328
1976	96	74	112	95	-21	308
1977	8	6	102	87	-81	227
1978	180	140	109	93	47	274
1979	79	61	101	86	-25	249
1980	155	120	105	89	31	280
1981	79	61	97	82	-21	259
1982	221	171	103	87	84	343
1983	220	171	110	94	77	420
1984	191	148	107	91	57	476
1985	95	74	103	87	-14	463
1986	126	98	105	89	8	471
1987	83	64	111	94	-30	441
1988	61	47	102	86	-39	402
1989	146	113	107	91	22	425
1990	89	69	102	86	-17	407
1991	57	44	100	85	-41	367
1992	39	30	86	73	-43	324
1993	200	155	84	72	83	407
AVERAGE	129	100	103	88	13	
MAX	229	177	114	97	84	
MIN	8	6	82	70	-81	
TOTAL	4139	3208	3295	2800	407	

Table 6-100.
OPTION 6 - 100,000 CY
Reserve up to 25,000 cubic yards for the river each year.
Harvest the rest.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	ANNUAL HARVEST (MCY)	RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	57	25	25
1963	162	126	101	25	50
1964	126	98	73	25	75
1965	147	114	89	25	100
1966	123	95	70	25	125
1967	136	105	80	25	150
1968	91	71	46	25	175
1969	178	138	113	25	200
1970	114	88	63	25	225
1971	177	137	112	25	250
1972	147	114	89	25	275
1973	121	94	69	25	300
1974	229	177	152	25	325
1975	157	122	97	25	350
1976	96	74	49	25	375
1977	8	6	0	6	381
1978	180	140	115	25	406
1979	79	61	36	25	431
1980	155	120	95	25	456
1981	79	61	36	25	481
1982	221	171	146	25	506
1983	220	171	146	25	531
1984	191	148	123	25	556
1985	95	74	49	25	581
1986	126	98	73	25	606
1987	83	64	39	25	631
1988	61	47	22	25	656
1989	146	113	88	25	681
1990	89	69	44	25	706
1991	57	44	19	25	731
1992	39	30	5	25	756
1993	200	155	130	25	781
AVERAGE	129	100	76	24	
MAX	229	177	152	25	
MIN	8	6	0	6	
TOTAL	4139	3208	2427	781	

Table 7-100.
OPTION 7 - 100,000 CY
Harvest 85 percent of 3-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	3-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	82	70	12	12
1963	162	126	104	88	37	50
1964	126	98	102	87	11	61
1965	147	114	112	96	18	79
1966	123	95	102	87	8	88
1967	136	105	105	89	16	104
1968	91	71	90	77	-6	97
1969	178	138	105	89	49	146
1970	114	88	99	84	4	151
1971	177	137	121	103	34	185
1972	147	114	113	96	18	203
1973	121	94	115	98	-4	199
1974	229	177	128	109	68	267
1975	157	122	131	111	10	277
1976	96	74	125	106	-31	246
1977	8	6	67	57	-51	195
1978	180	140	73	62	77	272
1979	79	61	69	59	3	275
1980	155	120	107	91	29	304
1981	79	61	81	69	-8	296
1982	221	171	118	100	71	368
1983	220	171	134	114	56	424
1984	191	148	163	139	9	433
1985	95	74	131	111	-37	396
1986	126	98	106	90	7	403
1987	83	64	79	67	-2	400
1988	61	47	70	59	-12	388
1989	146	113	75	64	49	438
1990	89	69	76	65	4	442
1991	57	44	75	64	-20	422
1992	39	30	48	41	-10	412
1993	200	155	76	65	90	502
AVERAGE	129	100	99	85	16	
MAX	229	177	163	139	90	
MIN	8	6	48	41	-51	
TOTAL	4139	3208	3184	2706	502	

Table 8-100.
OPTION 8 - 100,000 CY
Harvest 125,000 cy per year or the average annual which ever is greater. Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	82	82	125	-43	-43
1963	162	126	104	125	1	-42
1964	126	98	102	125	-27	-70
1965	147	114	105	125	-11	-81
1966	123	95	103	125	-30	-110
1967	136	105	103	125	-20	-130
1968	91	71	99	125	-54	-184
1969	178	138	104	125	13	-172
1970	114	88	102	125	-37	-208
1971	177	137	105	125	12	-196
1972	147	114	106	125	-11	-207
1973	121	94	105	125	-31	-238
1974	229	177	111	125	52	-186
1975	157	122	111	125	-3	-189
1976	96	74	109	125	-51	-240
1977	8	6	103	125	-119	-359
1978	180	140	105	125	15	-344
1979	79	61	102	125	-64	-408
1980	155	120	103	125	-5	-413
1981	79	61	101	125	-64	-476
1982	221	171	105	125	46	-430
1983	220	171	108	125	46	-385
1984	191	148	109	125	23	-362
1985	95	74	108	125	-51	-413
1986	126	98	107	125	-27	-440
1987	83	64	106	125	-61	-501
1988	61	47	104	125	-78	-579
1989	146	113	104	125	-12	-591
1990	89	69	103	125	-56	-647
1991	57	44	101	125	-81	-728
1992	39	30	98	125	-95	-822
1993	200	155	100	125	30	-792
AVERAGE	129	100	104	125	-25	
MAX	229	177	111	125	52	
MIN	8	6	82	125	-119	
TOTAL	4139	3208	3317	4000	-792	

ANALYSIS OF OPTIONS ASSUMING AVERAGE ANNUAL REPLENISHMENT IS 150,000 CUBIC YARDS

Table 1-150.
OPTION 1 - 150,000 CY
Harvest Annual Replenishment Each Year.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISHMENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	0	123	0
1963	162	188	0	188	0
1964	126	147	0	147	0
1965	147	171	0	171	0
1966	123	143	0	143	0
1967	136	158	0	158	0
1968	91	106	0	106	0
1969	178	207	0	207	0
1970	114	133	0	133	0
1971	177	206	0	206	0
1972	147	171	0	171	0
1973	121	141	0	141	0
1974	229	266	0	266	0
1975	157	183	0	183	0
1976	96	112	0	112	0
1977	8	9	0	9	0
1978	180	209	0	209	0
1979	79	92	0	92	0
1980	155	180	0	180	0
1981	79	92	0	92	0
1982	221	257	0	257	0
1983	220	256	0	256	0
1984	191	222	0	222	0
1985	95	110	0	110	0
1986	126	147	0	147	0
1987	83	97	0	97	0
1988	61	71	0	71	0
1989	146	170	0	170	0
1990	89	104	0	104	0
1991	57	66	0	66	0
1992	39	45	0	45	0
1993	200	233	0	233	0
AVERAGE	129	150	0	150	
MAX	229	266	0	266	
MIN	8	9	0	9	
TOTAL	4139	4814	0	4814	

Table 2-150.
OPTION 2 - 150,000 CY
Harvest 85 percent of replenishment each year.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	18	105	18
1963	162	188	28	160	47
1964	126	147	22	125	69
1965	147	171	26	145	94
1966	123	143	21	122	116
1967	136	158	24	134	140
1968	91	106	16	90	155
1969	178	207	31	176	186
1970	114	133	20	113	206
1971	177	206	31	175	237
1972	147	171	26	145	263
1973	121	141	21	120	284
1974	229	266	40	226	324
1975	157	183	27	155	351
1976	96	112	17	95	368
1977	8	9	1	8	369
1978	180	209	31	178	401
1979	79	92	14	78	415
1980	155	180	27	153	442
1981	79	92	14	78	455
1982	221	257	39	218	494
1983	220	256	38	217	532
1984	191	222	33	189	566
1985	95	110	17	94	582
1986	126	147	22	125	604
1987	83	97	14	82	619
1988	61	71	11	60	629
1989	146	170	25	144	655
1990	89	104	16	88	670
1991	57	66	10	56	680
1992	39	45	7	39	687
1993	200	233	35	198	722
AVERAGE	129	150	23	128	
MAX	229	266	40	226	
MIN	8	9	1	8	
TOTAL	4139	4814	722	4092	

Table 3-150.
OPTION 3 - 150,000 CY
Harvest 85 percent of average annual replenishment. Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	123	105	18	18
1963	162	188	156	132	56	74
1964	126	147	153	130	17	91
1965	147	171	157	134	37	128
1966	123	143	154	131	12	140
1967	136	158	155	132	26	167
1968	91	106	148	126	-20	147
1969	178	207	155	132	75	221
1970	114	133	153	130	3	224
1971	177	206	158	134	71	296
1972	147	171	159	135	36	331
1973	121	141	158	134	7	338
1974	229	266	166	141	125	463
1975	157	183	167	142	40	503
1976	96	112	164	139	-27	476
1977	8	9	154	131	-122	354
1978	180	209	157	134	76	430
1979	79	92	154	131	-39	391
1980	155	180	155	132	49	440
1981	79	92	152	129	-37	403
1982	221	257	157	133	124	526
1983	220	256	161	137	119	645
1984	191	222	164	139	83	728
1985	95	110	162	137	-27	701
1986	126	147	161	137	10	710
1987	83	97	159	135	-38	672
1988	61	71	155	132	-61	611
1989	146	170	156	133	37	648
1990	89	104	154	131	-27	621
1991	57	66	151	129	-62	558
1992	39	45	148	126	-80	478
1993	200	233	150	128	105	583
AVERAGE	129	150	156	132	18	
MAX	229	266	167	142	125	
MIN	8	9	123	105	-122	
TOTAL	4139	4814	4977	4231	583	

Table 4-150.
OPTION 4 - 150,000 CY
Harvest 85 percent of 5-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	5-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	123	105	18	18
1963	162	188	156	132	56	74
1964	126	147	153	130	17	91
1965	147	171	157	134	37	128
1966	123	143	154	131	12	140
1967	136	158	161	137	21	161
1968	91	106	145	123	-17	144
1969	178	207	157	133	74	217
1970	114	133	149	127	6	223
1971	177	206	162	138	68	291
1972	147	171	164	140	31	322
1973	121	141	171	146	-5	317
1974	229	266	183	156	111	428
1975	157	183	193	164	18	446
1976	96	112	174	148	-37	410
1977	8	9	142	121	-111	298
1978	180	209	156	132	77	375
1979	79	92	121	103	-11	364
1980	155	180	120	102	78	442
1981	79	92	117	99	-7	435
1982	221	257	166	141	116	551
1983	220	256	175	149	107	657
1984	191	222	201	171	51	708
1985	95	110	187	159	-49	659
1986	126	147	198	169	-22	637
1987	83	97	166	141	-45	592
1988	61	71	129	110	-39	554
1989	146	170	119	101	69	622
1990	89	104	117	100	4	626
1991	57	66	101	86	-20	606
1992	39	45	91	78	-32	574
1993	200	233	124	105	128	702
AVERAGE	129	150	151	129	22	
MAX	229	266	201	171	128	
MIN	8	9	91	78	-111	
TOTAL	4139	4814	4838	4112	702	

Table 5-150.
OPTION 5 - 150,000 CY
Harvest 85 percent of 10-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	10-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	123	105	18	18
1963	162	188	156	132	56	74
1964	126	147	153	130	17	91
1965	147	171	157	134	37	128
1966	123	143	154	131	12	140
1967	136	158	155	132	26	167
1968	91	106	148	126	-20	147
1969	178	207	155	132	75	221
1970	114	133	153	130	3	224
1971	177	206	158	134	71	296
1972	147	171	163	138	32	328
1973	121	141	158	134	6	334
1974	229	266	170	145	122	456
1975	157	183	171	146	37	493
1976	96	112	168	143	-31	462
1977	8	9	153	130	-121	341
1978	180	209	164	139	70	411
1979	79	92	152	129	-37	373
1980	155	180	157	133	47	420
1981	79	92	145	124	-32	389
1982	221	257	154	131	126	515
1983	220	256	166	141	115	630
1984	191	222	161	137	85	715
1985	95	110	154	131	-20	694
1986	126	147	157	134	13	707
1987	83	97	166	141	-45	662
1988	61	71	152	130	-59	604
1989	146	170	160	136	34	638
1990	89	104	152	130	-26	611
1991	57	66	150	127	-61	550
1992	39	45	129	109	-64	486
1993	200	233	126	107	125	611
AVERAGE	129	150	154	131	19	
MAX	229	266	171	146	126	
MIN	8	9	123	105	-121	
TOTAL	4139	4814	4944	4202	611	

Table 6-150.
OPTION 6 - 150,000 CY
Reserve up to 25,000 cubic yards for the river each year.
Harvest the rest.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	ANNUAL HARVEST (MCY)	RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	98	25	25
1963	162	188	163	25	50
1964	126	147	122	25	75
1965	147	171	146	25	100
1966	123	143	118	25	125
1967	136	158	133	25	150
1968	91	106	81	25	175
1969	178	207	182	25	200
1970	114	133	108	25	225
1971	177	206	181	25	250
1972	147	171	146	25	275
1973	121	141	116	25	300
1974	229	266	241	25	325
1975	157	183	158	25	350
1976	96	112	87	25	375
1977	8	9	3	6	381
1978	180	209	184	25	406
1979	79	92	67	25	431
1980	155	180	155	25	456
1981	79	92	67	25	481
1982	221	257	232	25	506
1983	220	256	231	25	531
1984	191	222	197	25	556
1985	95	110	85	25	581
1986	126	147	122	25	606
1987	83	97	72	25	631
1988	61	71	46	25	656
1989	146	170	145	25	681
1990	89	104	79	25	706
1991	57	66	41	25	731
1992	39	45	20	25	756
1993	200	233	208	25	781
AVERAGE	129	150	126	24	
MAX	229	266	241	25	
MIN	8	9	3	6	
TOTAL	4139	4814	4033	781	

Table 7-150.
OPTION 7 - 150,000 CY
Harvest 85 percent of 3-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	3-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	123	105	18	18
1963	162	188	156	132	56	74
1964	126	147	153	130	17	91
1965	147	171	169	143	28	119
1966	123	143	154	130	13	131
1967	136	158	157	134	24	156
1968	91	106	136	115	-9	146
1969	178	207	157	133	74	220
1970	114	133	148	126	6	226
1971	177	206	182	155	51	277
1972	147	171	170	144	27	304
1973	121	141	173	147	-6	298
1974	229	266	193	164	103	401
1975	157	183	197	167	16	416
1976	96	112	187	159	-47	369
1977	8	9	101	86	-77	292
1978	180	209	110	94	116	408
1979	79	92	104	88	4	412
1980	155	180	160	136	44	456
1981	79	92	121	103	-11	445
1982	221	257	176	150	107	552
1983	220	256	202	171	85	636
1984	191	222	245	208	14	650
1985	95	110	196	167	-56	594
1986	126	147	160	136	11	605
1987	83	97	118	100	-4	601
1988	61	71	105	89	-18	583
1989	146	170	112	96	74	657
1990	89	104	115	98	6	663
1991	57	66	113	96	-30	633
1992	39	45	72	61	-16	618
1993	200	233	115	98	135	753
AVERAGE	129	150	149	127	24	
MAX	229	266	245	208	135	
MIN	8	9	72	61	-77	
TOTAL	4139	4814	4778	4061	753	

Table 8-150.
OPTION 8 - 150,000 CY
Harvest 125,000 cy per year or the average annual replenishment which ever is greater. Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	123	123	125	18	18
1963	162	188	156	132	56	74
1964	126	147	153	130	17	91
1965	147	171	157	134	37	128
1966	123	143	154	131	12	140
1967	136	158	155	132	26	167
1968	91	106	148	126	-20	147
1969	178	207	155	132	75	221
1970	114	133	153	130	3	224
1971	177	206	158	134	71	296
1972	147	171	159	135	36	331
1973	121	141	158	134	7	338
1974	229	266	166	141	125	463
1975	157	183	167	142	40	503
1976	96	112	164	139	-27	476
1977	8	9	154	131	-122	354
1978	180	209	157	134	76	430
1979	79	92	154	131	-39	391
1980	155	180	155	132	49	440
1981	79	92	152	129	-37	403
1982	221	257	157	133	124	526
1983	220	256	161	137	119	645
1984	191	222	164	139	83	728
1985	95	110	162	137	-27	701
1986	126	147	161	137	10	710
1987	83	97	159	135	-38	672
1988	61	71	155	132	-61	611
1989	146	170	156	133	37	648
1990	89	104	154	131	-27	621
1991	57	66	151	129	-62	558
1992	39	45	148	126	-80	478
1993	200	233	150	128	105	583
AVERAGE	129	150	156	132	18	
MAX	229	266	167	142	125	
MIN	8	9	123	105	-122	
TOTAL	4139	4814	4977	4231	583	

ANALYSIS OF OPTIONS ASSUMING AVERAGE ANNUAL REPLENISHMENT IS 200,000 CUBIC YARDS

Table 1-200.
OPTION 1 - 200,000 CY
Harvest Annual Replenishment Each Year.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISHMENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	0	164	0
1963	162	251	0	251	0
1964	126	195	0	195	0
1965	147	228	0	228	0
1966	123	191	0	191	0
1967	136	211	0	211	0
1968	91	141	0	141	0
1969	178	276	0	276	0
1970	114	177	0	177	0
1971	177	274	0	274	0
1972	147	228	0	228	0
1973	121	188	0	188	0
1974	229	355	0	355	0
1975	157	243	0	243	0
1976	96	149	0	149	0
1977	8	12	0	12	0
1978	180	279	0	279	0
1979	79	122	0	122	0
1980	155	240	0	240	0
1981	79	122	0	122	0
1982	221	343	0	343	0
1983	220	341	0	341	0
1984	191	296	0	296	0
1985	95	147	0	147	0
1986	126	195	0	195	0
1987	83	129	0	129	0
1988	61	95	0	95	0
1989	146	226	0	226	0
1990	89	138	0	138	0
1991	57	88	0	88	0
1992	39	60	0	60	0
1993	200	310	0	310	0
AVERAGE	129	200	0	200	
MAX	229	355	0	355	
MIN	8	12	0	12	
TOTAL	4139	6415	0	6415	

Table 2-200.
OPTION 2 - 200,000 CY
Reserve 15 percent of replenishment for river each year. Harvest 85 percent

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AMOUNT RESERVED FOR RIVER (MCY)	RELATIVE ANNUAL HARVEST (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	25	140	25
1963	162	251	38	213	62
1964	126	195	29	166	92
1965	147	228	34	194	126
1966	123	191	29	162	154
1967	136	211	32	179	186
1968	91	141	21	120	207
1969	178	276	41	235	249
1970	114	177	27	150	275
1971	177	274	41	233	316
1972	147	228	34	194	350
1973	121	188	28	159	379
1974	229	355	53	302	432
1975	157	243	37	207	468
1976	96	149	22	126	491
1977	8	12	2	11	492
1978	180	279	42	237	534
1979	79	122	18	104	553
1980	155	240	36	204	589
1981	79	122	18	104	607
1982	221	343	51	291	658
1983	220	341	51	290	710
1984	191	296	44	252	754
1985	95	147	22	125	776
1986	126	195	29	166	805
1987	83	129	19	109	825
1988	61	95	14	80	839
1989	146	226	34	192	873
1990	89	138	21	117	893
1991	57	88	13	75	907
1992	39	60	9	51	916
1993	200	310	47	264	962
AVERAGE	129	200	30	170	
MAX	229	355	53	302	
MIN	8	12	2	11	
TOTAL	4139	6415	962	5453	

Table 3-200.
OPTION 3 - 200,000 CY
Harvest 85 percent of average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	164	140	25	25
1963	162	251	208	177	75	99
1964	126	195	204	173	22	121
1965	147	228	210	178	50	171
1966	123	191	206	175	16	187
1967	136	211	207	176	35	222
1968	91	141	197	168	-27	195
1969	178	276	207	176	100	295
1970	114	177	204	173	4	299
1971	177	274	211	179	95	394
1972	147	228	212	180	47	441
1973	121	188	210	179	9	450
1974	229	355	221	188	167	617
1975	157	243	223	190	54	671
1976	96	149	218	185	-37	634
1977	8	12	205	174	-162	472
1978	180	279	210	178	101	573
1979	79	122	205	174	-52	521
1980	155	240	207	176	65	586
1981	79	122	202	172	-50	537
1982	221	343	209	178	165	701
1983	220	341	215	183	158	860
1984	191	296	219	186	110	970
1985	95	147	216	183	-36	934
1986	126	195	215	183	13	947
1987	83	129	211	180	-51	896
1988	61	95	207	176	-82	814
1989	146	226	208	177	50	864
1990	89	138	205	175	-37	827
1991	57	88	202	171	-83	744
1992	39	60	197	167	-107	637
1993	200	310	200	170	140	777
AVERAGE	129	200	207	176	24	
MAX	229	355	223	190	167	
MIN	8	12	164	140	-162	
TOTAL	4139	6415	6634	5639	777	

Table 4-200.
OPTION 4 - 200,000 CY
Harvest 85 percent of 5-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	10-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	164	140	25	25
1963	162	251	208	177	75	99
1964	126	195	204	173	22	121
1965	147	228	210	178	50	171
1966	123	191	206	175	16	187
1967	136	211	215	183	28	215
1968	91	141	193	164	-23	192
1969	178	276	209	178	98	290
1970	114	177	199	169	8	297
1971	177	274	216	183	91	388
1972	147	228	219	186	42	430
1973	121	188	228	194	-7	423
1974	229	355	244	208	147	570
1975	157	243	258	219	24	595
1976	96	149	233	198	-49	546
1977	8	12	189	161	-149	397
1978	180	279	208	177	102	500
1979	79	122	161	137	-15	485
1980	155	240	161	136	104	589
1981	79	122	155	132	-10	579
1982	221	343	221	188	154	734
1983	220	341	234	199	142	876
1984	191	296	268	228	68	944
1985	95	147	250	212	-65	879
1986	126	195	264	225	-29	849
1987	83	129	222	188	-60	790
1988	61	95	172	147	-52	738
1989	146	226	158	135	92	829
1990	89	138	157	133	5	834
1991	57	88	135	115	-27	808
1992	39	60	122	103	-43	765
1993	200	310	165	140	170	935
AVERAGE	129	200	201	171	29	
MAX	229	355	268	228	170	
MIN	8	12	122	103	-149	
TOTAL	4139	6415	6448	5481	935	

Table 5-200.
OPTION 5 - 200,000 CY
Harvest 85 percent of 10-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	10-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	164	140	25	25
1963	162	251	208	177	75	99
1964	126	195	204	173	22	121
1965	147	228	210	178	50	171
1966	123	191	206	175	16	187
1967	136	211	207	176	35	222
1968	91	141	197	168	-27	195
1969	178	276	207	176	100	295
1970	114	177	204	173	4	299
1971	177	274	211	179	95	394
1972	147	228	217	185	43	437
1973	121	188	211	179	8	445
1974	229	355	227	193	162	608
1975	157	243	228	194	49	657
1976	96	149	224	191	-42	615
1977	8	12	204	174	-161	454
1978	180	279	218	185	94	548
1979	79	122	203	172	-50	498
1980	155	240	209	178	63	560
1981	79	122	194	165	-42	518
1982	221	343	205	175	168	686
1983	220	341	221	188	153	839
1984	191	296	215	183	113	953
1985	95	147	205	174	-27	926
1986	126	195	210	178	17	942
1987	83	129	221	188	-60	883
1988	61	95	203	173	-78	805
1989	146	226	213	181	45	850
1990	89	138	203	173	-35	815
1991	57	88	200	170	-81	733
1992	39	60	172	146	-85	648
1993	200	310	168	143	167	815
AVERAGE	129	200	206	175	25	
MAX	229	355	228	194	168	
MIN	8	12	164	140	-161	
TOTAL	4139	6415	6589	5601	815	

Table 6-200.
OPTION 6 - 200,000 CY
Reserve up to 25,000 cubic yards for the river each year.
Harvest the rest.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	ANNUAL HARVEST (MCY)	RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	139	25	25
1963	162	251	226	25	50
1964	126	195	170	25	75
1965	147	228	203	25	100
1966	123	191	166	25	125
1967	136	211	186	25	150
1968	91	141	116	25	175
1969	178	276	251	25	200
1970	114	177	152	25	225
1971	177	274	249	25	250
1972	147	228	203	25	275
1973	121	188	163	25	300
1974	229	355	330	25	325
1975	157	243	218	25	350
1976	96	149	124	25	375
1977	8	12	6	6	381
1978	180	279	254	25	406
1979	79	122	97	25	431
1980	155	240	215	25	456
1981	79	122	97	25	481
1982	221	343	318	25	506
1983	220	341	316	25	531
1984	191	296	271	25	556
1985	95	147	122	25	581
1986	126	195	170	25	606
1987	83	129	104	25	631
1988	61	95	70	25	656
1989	146	226	201	25	681
1990	89	138	113	25	706
1991	57	88	63	25	731
1992	39	60	35	25	756
1993	200	310	285	25	781
AVERAGE	129	200	176	24	
MAX	229	355	330	25	
MIN	8	12	6	6	
TOTAL	4139	6415	5634	781	

Table 7-200.
OPTION 7 - 200,000 CY
Harvest 85 percent of 3-year average annual replenishment.
Reserve rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	3-YEAR AVERAGE ANNUAL REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	164	140	25	25
1963	162	251	208	177	75	99
1964	126	195	204	173	22	121
1965	147	228	225	191	37	158
1966	123	191	205	174	17	175
1967	136	211	210	178	32	208
1968	91	141	181	154	-13	195
1969	178	276	209	178	98	293
1970	114	177	198	168	8	301
1971	177	274	242	206	68	370
1972	147	228	226	192	35	405
1973	121	188	230	195	-8	397
1974	229	355	257	218	137	534
1975	157	243	262	223	21	555
1976	96	149	249	212	-63	492
1977	8	12	135	115	-102	390
1978	180	279	147	125	154	544
1979	79	122	138	117	5	549
1980	155	240	214	182	58	608
1981	79	122	162	137	-15	593
1982	221	343	235	200	143	735
1983	220	341	269	228	113	848
1984	191	296	327	278	18	866
1985	95	147	261	222	-75	791
1986	126	195	213	181	14	806
1987	83	129	157	134	-5	801
1988	61	95	140	119	-24	777
1989	146	226	150	127	99	876
1990	89	138	153	130	8	884
1991	57	88	151	128	-40	844
1992	39	60	96	81	-21	823
1993	200	310	153	130	180	1003
AVERAGE	129	200	199	169	31	
MAX	229	355	327	278	180	
MIN	8	12	96	81	-102	
TOTAL	4139	6415	6367	5412	1003	

Table 8-200.
OPTION 8 - 200,000 CY
Harvest 125,000 cy or 85 percent of average annual replenishment, whichever is greater. Reserve the rest for river.

YEAR	EST. ANNUAL BEDLOAD DISCHARGE (MCY)	RELATIVE ANNUAL REPLENISH MENT (MCY)	AVERAGE ANNUAL RELATIVE REPLENISH MENT (MCY)	RELATIVE ANNUAL HARVEST (MCY)	RELATIVE VOLUME RESERVED FOR RIVER (MCY)	CUM RIVER GAIN (MCY)
1962	106	164	164	140	25	25
1963	162	251	208	177	75	99
1964	126	195	204	173	22	121
1965	147	228	210	178	50	171
1966	123	191	206	175	16	187
1967	136	211	207	176	35	222
1968	91	141	197	168	-27	195
1969	178	276	207	176	100	295
1970	114	177	204	173	4	299
1971	177	274	211	179	95	394
1972	147	228	212	180	47	441
1973	121	188	210	179	9	450
1974	229	355	221	188	167	617
1975	157	243	223	190	54	671
1976	96	149	218	185	-37	634
1977	8	12	205	174	-162	472
1978	180	279	210	178	101	573
1979	79	122	205	174	-52	521
1980	155	240	207	176	65	586
1981	79	122	202	172	-50	537
1982	221	343	209	178	165	701
1983	220	341	215	183	158	860
1984	191	296	219	186	110	970
1985	95	147	216	183	-36	934
1986	126	195	215	183	13	947
1987	83	129	211	180	-51	896
1988	61	95	207	176	-82	814
1989	146	226	208	177	50	864
1990	89	138	205	175	-37	827
1991	57	88	202	171	-83	744
1992	39	60	197	167	-107	637
1993	200	310	200	170	140	777
AVERAGE	129	200	207	176	24	
MAX	229	355	223	190	167	
MIN	8	12	164	140	-162	
TOTAL	4139	6415	6634	5639	777	

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Attachment 3

1993 MOA Extension reports:

Scientific Committee Gravel Extraction Recommendation Report
&
Wildlife Report
for
Lower Mad River

prepared by

Mad River Biologists

August 17, 1993

Michael Chrisman, Deputy Secretary
State of California, Resources Agency
1416 Ninth Street, 13th Floor
Sacramento, California 95814

RE: Gravel Extraction Recommendations for 1993 on the Mad River from the Mad River Scientific Committee

Dear Michael,

Attached is an initial report describing the recommendations made by the Mad River Scientific Committee for gravel extraction in 1993 on the lower Mad River, Humboldt County, California. As mentioned in the report, fulfillment of our charges (as described in the "1993 Addendum Extending Memorandum of Agreement Concerning Gravel Extraction Operations on the Mad River in Humboldt County") for the current mining season will be accomplished in two phases: the first (attached) to include our recommendations for gravel extraction and the second to report on results of our other responsibilities. We have phased this project so that our recommendations can be implemented as soon as possible given that most of the mining season is already behind us. The report on the second phase of our work will be delivered as soon as possible (our target date of completion is September 7, 1993).

We greatly appreciate the opportunity to play a role in the evolution of environmentally sound gravel extraction practices, and we are encouraged by the progress achieved thus far. Please contact any one of us if you have any questions.

Sincerely,

Randy D. Klein

Randy D. Klein, Hydrologist, for:

Dr. Doug Jager
Dr. Andre Lehre
Dr. William Trush

xc: Tom Conlon, Humboldt County Planning Department
Larry Preston, Calif. Dept. of Fish and Game

GRAVEL EXTRACTION TECHNICAL COMMITTEE

REPORT OF THE SCIENTIFIC COMMITTEE

RECOMMENDATIONS FOR 1993 EXTRACTIONS ON THE MAD RIVER

Randy Klein
Doug Jager
Andre Lehre
Bill Trush

16 July, 1993

INTRODUCTION

As in 1992, the Scientific Committee was charged by the Technical Committee to recommend environmentally sound gravel extraction based on field inspections of river conditions and reviews of technical information on the Mad River below the Mad River State Fish Hatchery. Specific extraction sites to be reviewed, as well as the spectrum of concerns to be balanced, were detailed in a letter from Banky Curtis, Regional Manager, California Department of Fish and Game, Region 1, dated 12 June, 1992. For 1993, we were again charged with these and other responsibilities by extension and revision of the Memorandum of Agreement developed in 1992.

In addition to mining recommendations for the 1993 extraction season, the Scientific Committee is to: 1) determine compliance with the 1992 recommendations by reviewing post-extraction survey information, 2) characterize the river's behavior in response to 1992 extractions and the subsequent 1992-93 winter high flow season, and 3) make further recommendations (beyond those given in 1992) for improving the utility of monitoring information collected by the operators and/or their consultants.

In the interest of time, this report will only present gravel extraction recommendations for 1993. An addendum will follow as soon as possible reporting on the remaining activities of the Scientific Committee for the current season. While we have included volume estimates in this report for each specific location, the actual amounts taken to achieve the recommended configuration (horizontal limits, elevations, and slopes) may vary by 10% or more. Accordingly, compliance with our specifications should be determined on the basis of the post-extraction bar surface configurations, not the actual volumes taken.

Personnel and Individual Responsibilities and Progress

Doug Jager, Andre Lehre and Randy Klein conducted field inspections of the extraction sites. Although Bill Trush could not participate in these field inspections, he had been out on the river several times on his own and was generally familiar with conditions at several sites. He participated in reviews of the technical information and development of recommendations with the other committee members.

Dr. Jager obtained most of the technical information (cross section surveys and air photos) from the operators' consultants. Randy Klein compiled the committee's recommendations onto the cross section plots and air photos, calculated gravel extraction volumes, and wrote this report. All recommendations given here were arrived at by consensus of the full committee.

We felt it imperative to begin development of our recommendations only after receiving technical information from all the sites to be reviewed. Only with complete information could we make sound recommendations which took into consideration the continuity of river processes for the entire mined reach. We received this information on about 23 July, 1993. We began field inspections on 1 August, and completed them by 6 August. Prescriptions were done by 13 August, and this report was completed and sent out by 17 August.

Our progress was aided by improvements in the quality of data provided to us this year compared to last year. The addendum to this report will outline further refinements in monitoring data to better facilitate development of prescriptions in the future.

General Observations of the Lower Mad River

The 1992-93 winter runoff season ended a six-year drought. Consequently, the volume of gravel transported from upstream into the lower river (recruitment) was likely much higher than in any year since 1986. A large proportion of the gravel carried to the lower river was trapped in large trenches dug during extraction operations in 1990 and 1991. These trenches were still quite obvious in 1992.

While the gravel which filled trenches constitutes replenishment (replacement of previously mined gravel), we did not consider this material as part of the "available" volume for 1993 extractions. Rather, we viewed this process as analogous to repayment of a high interest, short term loan against the sediment budget of the river. Having repaid this "debt", a greater proportion of gravel replenishment in the future should occur on bar surfaces within the mined reach.

In addition to filling of trenches, many cross sections showed large changes on bar surfaces. These changes represented both aggradation (gravel deposition) and degradation (gravel scour). Overall, aggradation was greater than degradation. Similarly, thalweg elevations rose on most cross sections, although a few showed some lowering. Thalweg elevation increases were due

primarily to filling of trenches, while thalweg lowering was most likely the result of erosion of the stream bed because of close proximity to upstream and/or downstream trenches.

In general, we considered the river's response to the 1992 extraction to be favorable. Consequently, we believe that extraction of a similar total volume and by similar methods to be appropriate for 1993. The geographical distribution of what we determined to be "available" gravel has shifted downstream in 1993 compared to 1992. Our recommended site-specific extraction amounts reflect this shift. The total volume of extraction recommended for the Mad River in 1993 is approximately 122,000 cubic yards.

SITE-SPECIFIC GRAVEL EXTRACTION RECOMMENDATIONS

Generalized Rationale for Prescriptions

The most important criteria used in developing our prescriptions was the relative amount of scour (degradation) and fill (aggradation) which occurred. This was determined by comparison of the 1992 post-extraction cross sections with those of spring, 1993. In areas where the cross sections documented that the amount of fill significantly exceeded the amount of scour, gravel extraction was recommended. Areas showing the opposite were avoided.

We have revised our recommendations on the steepness of finished slopes on skimmed surfaces based on field observations and the results of this year's monitoring data. In 1992, we recommended slopes of 1% to 3% toward the channel. For 1993, some of our recommended slopes are less than 1% toward the channel, but are steeper than this in a downstream direction. This configuration replicates some of the "natural" deposits we observed in the river, and we do not anticipate fish stranding on skimmed surfaces because of the slope in the downstream direction.

In some areas, we recommended skimming of mid-channel bars. This was considered appropriate because of the ephemeral nature of these deposits (they are likely to be completely re-worked by the river in even moderate floods). Additionally, excavation of mid-channel bars might slow bank erosion in some instances by increasing channel capacity.

Guynup Bar (Mad River Sand and Gravel)

Prescription

We recommend that gravel be extracted by bar skimming at two locations according to the following specifications:

a. Gravel removal to begin at the elevation of the water surface as shown on cross sections done by Rising Sun Enterprises on June 22, 1993 (this elevation is about

1.5 feet above the present water surface) where the extraction is adjacent to the water's edge. At some locations, the riverward extraction limits are away from the water's edge. Gravel removal in these areas is to begin at the present ground surface elevations dictated by the following table of horizontal limits of extraction derived from cross sections.

b. The limits of extraction vary from cross section to cross section as specified in the table below. These limits refer to horizontal distances as shown on the Rising Sun Enterprises cross sections.

Cross Section	Riverward Limit	Landward Limit	Width
1	695	527	168
2	834	542	292
3	810	343	467
4	757	568	189
5	380	600	220
6	175	415	240
7	155	350	195
8	N/A	N/A	0

c. The horizontal limits of extraction between cross sections is defined by a smooth curve connecting the extraction limits at adjoining cross sections (see Fig. 1). Approximate areas of extraction are shown in relation to the cross section locations in Figure 1.

d. Skimming shall result in a smooth, planar surface sloping at no less than 1% in a direction toward the channel, downstream, or in any direction in between.

Amount of Extractable Gravel (1993)

We estimate that this prescription will yield approximately 19,500 cubic yards (cy) on the upper bar and 9500 cy on the lower bar (Fig. 1), for a total of 29,000 cy at this site.

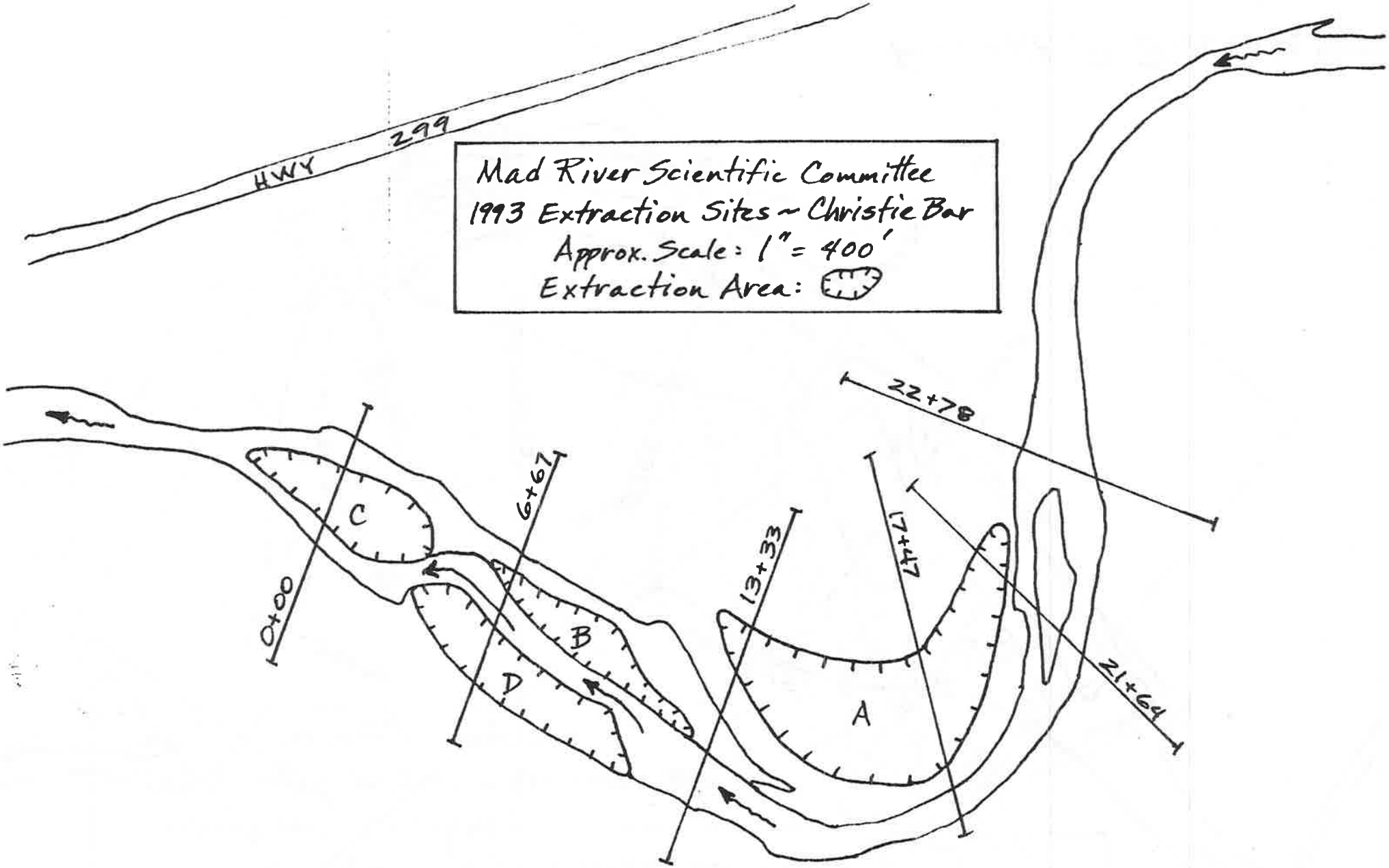

FIGURE 4. Christie Bar

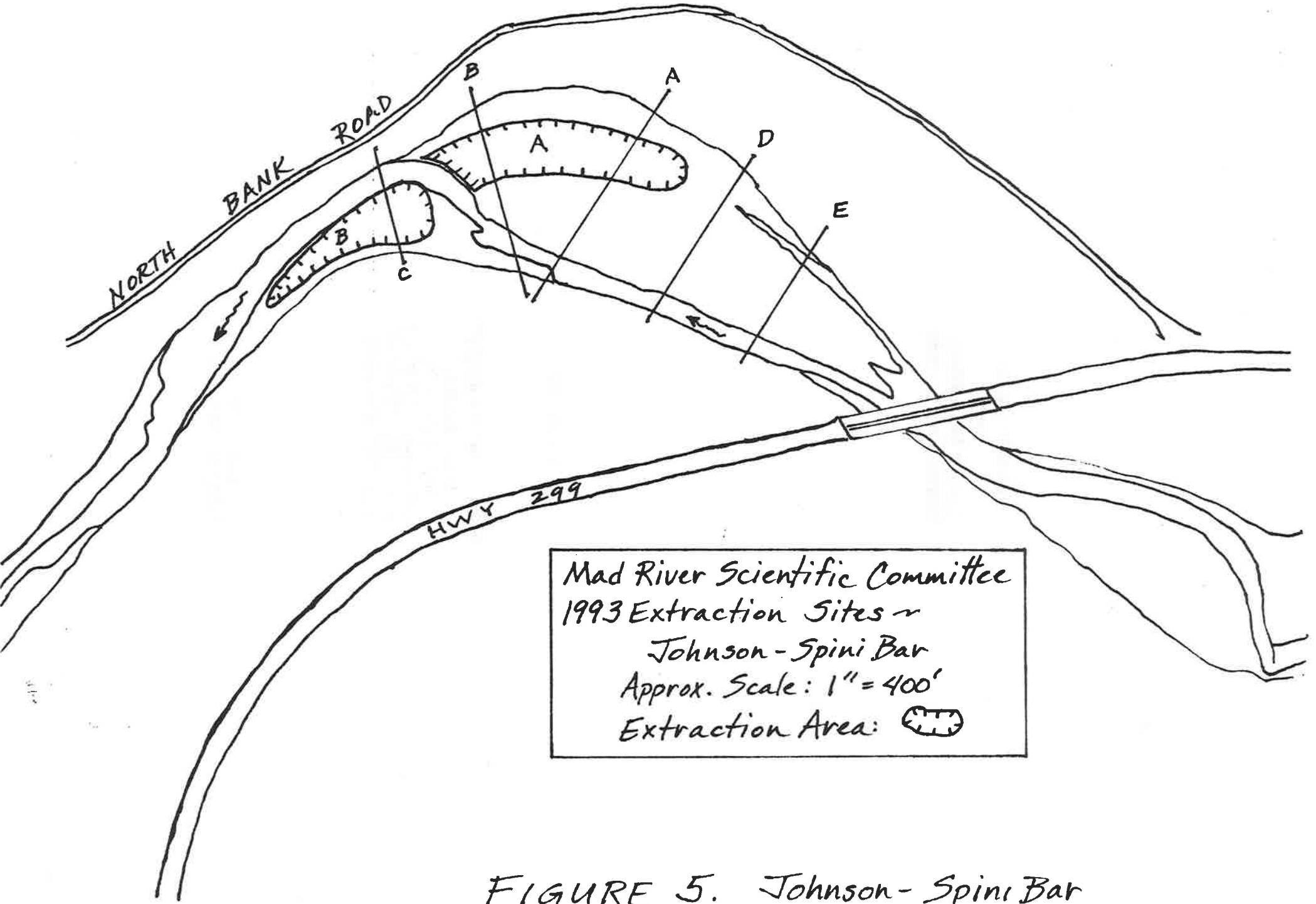

FIGURE 5. Johnson - Spini Bar

Wildlife Report
for
Lower Mad River
Humboldt County

prepared by

Mad River Biologists
Ron LeValley
1696 Ocean Dr.
McKinleyville CA 95521
Voice (707) 839-8134
Fax (707) 839-4656

submitted
2 September 1993

I. Introduction

The purpose of this PEIR is to identify existing and potentially significant environmental impacts resulting from instream gravel extraction operations on the lower Mad River, Humboldt County, California, and to consider feasible alternatives to instream mining. This section focuses on the effects of instream mining on the non-fish vertebrate wildlife species, i.e.. amphibians, reptiles, birds and mammals.

There has been concern regarding the effect of gravel mining on the wildlife and habitats of the study area. This report will describe the wildlife habitats of the study area, the wildlife species expected in each habitat, and the effect of changes in these habitats on the wildlife species. Special attention is given to those species considered endangered, threatened, or of special concern by the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

II. Methods

Field surveys were conducted during June, July and August, 1993. These surveys were conducted by walking along the river bank, across the gravel bars and through the riparian forests searching for wildlife and their signs. Dip nets were used to search for and capture aquatic vertebrates. Some tadpoles were collected alive, placed in an aquarium and raised to transformation for identification purposes. Rocks, downed wood and leaf litter were investigated searching for reptiles and amphibians in hiding. Tracks and dropppings were noted and identified.

Twenty-eight formal bird surveys were done at selected sites. These surveys were done for a period of ten minutes, during which time all detected vertebrates were recorded. The analysis of these data are not part of this report, but the summarized results are presented in the attachments.

III. Habitats

Riparian

The definition of Riparian Habitat follows that included in Botanical Resources Study for the PEIR prepared by Karen Theiss. For the purposes of this discussion regarding wildlife, it is useful to recognize a third category intermediate between riparian scrub and mature riparian forests. I refer to this as developing riparian forest. This can include very dense and mostly pure stands of willow (*Salix sp.*). These stands may be significant for Willow Flycatcher (see below).

Riparian habitat as a whole, in all of its successional stages, is a significant resource. Any activity that damages it would be considered significantly adverse -- whether or not any sensitive animals were found during this or other studies. Also, given the dynamic nature of riparian forests in general, all stages should be considered important.

Significant stands of developing and well-developed riparian vegetation exist along the Mad River in the study area. While the riparian habitat parallels the river along most of the study area, the largest stands are found just downstream of the Mad River Fish Hatchery, just downstream from the Blue Lake Bridge, below Azalea Park along North Bank Road and just upstream of the Hammond Bridge. The latter two sites have been partially logged or cleared during the past one to five years. The removal of some of the riparian habitat by activities not associated with gravel mining underlines the need for a comprehensive monitoring of the riparian habitats.

Riparian habitat is by nature a dynamic resource. As the river changes its course, some of the mature riparian along the river bank falls into the river as the banks erode. Other sites host developing riparian habitat as developing gravel bars stabilize. This process of succession is critical to the health of the riparian habitats and contributes to the character of the river in the form of woody debris.

The riparian forest provides habitat for nearly all of the reptile, amphibians, birds and mammals listed in Attachment A. Even those that do not use this habitat for feeding, nesting or cover, depend to some extent on the productivity of this habitat. Furthermore, the aquatic habitats (both riverine and pond) adjacent to the riparian forests not only receive organic matter (in the form of plant and animal material) from the riparian forest, but owe much of their physical structure to the influence of the riparian forests.

Gravel mining operations have three potential effects on riparian habitat and its wildlife populations. The first is the actual removal of riparian habitat due to construction of roads or processing sites. This effect can be mostly avoided in the design of future operations. The extent of past removal of riparian along the study area for the construction of existing gravel operations needs documenting.

The second is the direct effect of noise and dust from the mechanical operation. The noise and movement of equipment have an immediate effect on wildlife. While some species can become habituated to predictable and/or constant noise, others will simply be displaced.

The effect of high intensity noise on vertebrates has been studied in the laboratory and the field. Geber and Anderson (1967) documented significant changes in biochemistry and even anatomy as a result of noise stress. Bondello (1976) showed that desert iguanas (*Dipsosaurus dorsalis*) experienced temporary loss of hearing for periods of one week or more following less than one hour of motorcycle noise. Vehicle noise has been shown to disrupt nesting, impair hearing development (Marler et al. 1973), and harass several species of birds (Luckenbach 1975, 1978). Clearly the effects of noise are not insignificant in the short term or in the immediate vicinity of the operations. The long-term effects of noise and related disturbances are extremely difficult to gauge in the short term. Future monitoring efforts should include the ability to estimate the effects of the mining operations on wildlife populations. (see **Future Monitoring**).

The consequences of dust coating riparian vegetation is also of concern, as a layer of dust can inhibit or prevent both plant growth and insect use of plants, both of which consequently affect wildlife use of the habitat, by either directly or indirectly affecting food availability. Watering roads and other operational sites can reduce this dust and minimize its effect.

The third potential effect of gravel mining would result from changes in the location of the river channel as a result of the mining activity. These changes could alter the health and distribution of the riparian habitats. In particular, there is concern that the early successional stages could be altered on a regular basis, preventing the later successional stages from ever developing. An analysis of the distributional history of the riparian forests along the lower Mad River would be useful in assessing the present and future status of this habitat type.

Riverine

An important habitat to the fish and aquatic invertebrates of the Mad River system is the river itself. The health of the river obviously affects those species that depend on the fish and aquatic invertebrates for food, such as Double-crested Cormorant, Bald Eagle, Osprey, Common Merganser, and Dipper. In addition, infringements on water quality such as spilled petroleum products, waste water, and other by-products of the mining operation could have consequences for wildlife. Strict control over this aspect of the mining operation is necessary.

Gravel Bars

The gravel bar is the habitat most directly affected by the present mining operations. Gravel bars provide feeding habitat for birds such as Spotted Sandpiper and Killdeer, other shorebirds, and various raptors such as Bald Eagle and Turkey Vulture, and roosting sites for gulls and mergansers. In addition, the earliest successional stages of the riparian forests begin on the gravel bars.

The actual effect on wildlife using the gravel bars from mining operations will depend on the timing and duration of the mining season, the mining method used and the amount of gravel removed.

Temporary Pools and Edgewaters

This habitat category is defined to include the seasonal and temporary quiet waters that develop along the river's course. These can be shallow ponds that are flooded at high water and then disappear as the season progresses, or edgewaters and low sites within the river bed that stay wet all year long because of ground water. These ponds are considered temporary because their structure and distribution can change dramatically during high flow events. During the past few drought years, many of these ponds developed healthy stands of emergent aquatic vegetation. During the "normal flows" of 1992-93, much of the vegetation along many of these temporary pools was washed away.

This is one of the most important habitats for the Red-legged Frog and the Foothill Yellow-legged Frog. In addition, other amphibians such as Western Toads and Pacific Tree Frogs use this habitat extensively.

Freshwater Marshes and Ponds (including pits)

Various freshwater marsh and pond habitats occur adjacent to the river channel. These are distinguished from the above classification by their more-or-less permanent nature. As a consequence of their permanent nature, the aquatic vegetation is often well-developed and a more complex habitat structure results, providing homes for a variety of wildlife.

Some of these ponds are natural; some have come about as a consequence of past mining activity. There is potential for creating wildlife habitat using these ponds. Ponds on Christie Bar and Blue Lake Bar created by the gravel operators are providing habit for amphibians. Please see the discussion under Site Evaluations.

IV. Species Accounts

The following species accounts are intended to provide background information and present status in the study area for those species of Special Concern. Appendix A is a list of all species that were considered as possibly occurring in the study area. Appendix B is a list of all species detected in the course of this investigation.

Table 1.
Species of Special Concern

Northern Red-legged Frog	*Rana aurora aurora*	CA2,SC
Foothill Yellow-legged Frog	*Rana boylii*	CA2,SC
Bullfrog	*Rana catesbeiana*	I,HA
Northwestern Pond Turtle	*Clemmys marmorata marmorata*	CA2,SC
Double-crested Cormorant	*Phalacrocorax auritus*	SC
Bald Eagle	*Haliaeetus leucocephalus*	CE,FE,CP
Sharp-shinned Hawk	*Accipiter striatus*	SC
Cooper's Hawk	*Accipiter cooperi*	SC
Merlin	*Falco columbarius*	SC
American Peregrine Falcon	*Falco peregrinus anatum*	CE,FE,CP
Marbled Murrelet	*Brachyramphus marmorata*	CE, FT
Northern Spotted Owl	*Strix occidentalis caurina*	ST
Willow Flycatcher	*Empidonax trailii*	CE
Purple Martin	*Progne subis*	SC
Black-capped Chickadee	*Parus atricapillus*	SC
California Yellow Warbler	*Dendroica petechia brewsteri*	SC
Yellow-breasted Chat	*Icteria virens*	SC
White-footed Vole	*Arborimus albipes*	CA2,SC

CE - Listed as Endangered by the State of California
FE - Listed as Endangered by the Federal Government
CP - California Protected Species
CT - Listed as Threatened by the State of California
CA2 - Category 2 Candidate for listing by the Federal Government (existing information indicates listing may be warranted, but necessary biological data are lacking).
I - Introduced
HA - Harvested Species

Northern Red-legged Frog (*Rana aurora aurora*)

The Northern Red-legged Frog is considered a Species of Special Concern in California and is a Category 2 Candidate for Federal Listing. The main reasons for concern in California are declining habitat and predation by the introduced Bullfrog. (The California Red-legged Frog (*Rana aurora draytonii*), found in most of California save the north coast, is a Category 2 Candidate for listing. While the taxonomic status of our north coast frogs is beyond the scope of this paper, it is my belief that our red-legged frogs are ecologically similar to the northern subspecies and should be managed accordingly).

Locally, we find the Red-legged Frog is not as common along the rivers as the Foothill Yellow-legged Frog. The only adult Red-legged Frog detected in the study area was under a small piece of

driftwood alongside the "duck pond" on the Blue Lake Bar. Tadpoles possibly of this species (but probably Yellow-legged Frogs) were found in temporary puddles on the Guynup Bar and near the adjacent gravel stockpiles. Along the Eel River in 1992, Red-legged Frogs were found in **Temporary Pools and Edgewaters** where emergent aquatic vegetation had developed to provide sufficient cover. This emergent vegetation probably developed more extensively during the preceding drought years but this vegetation was not found along the Mad River in similar habitat during this field season. Red-legged Frogs are also found in many **Freshwater Marshes and Ponds** in the study area vicinity.

Gravel mining operations should avoid any disturbance of Red-legged Frog breeding ponds and maintain the integrity of adjacent riparian forests.

Foothill Yellow-legged Frog (*Rana boylii*)

The Foothill Yellow-legged Frog is found in coastal and foothill habitats throughout northern California (Stebbins 1985). Its preferred habitat is along streams and rivers, especially where riffles are present. The Yellow-legged Frog escapes into the water and hides among vegetation or in the bottom when disturbed. It is less likely to use the riparian forests and other adjacent habitats than other frogs. Breeding takes place later in the spring, when high water flows have subsided. Eggs are laid in a mass of up to 1,000 eggs and are attached to rocks in shallow, flowing water. Larvae transform into frogs during the summer (Stebbins 1985).

The Foothill Yellow-legged Frog is considered a Species of Special Concern in California and is a Category 2 Candidate for Federal Listing. The main reasons for concern in California are declining habitat and predation by the introduced Bullfrog.

Along the north coast, Yellow-legged Frogs are found in most rivers and large streams. It is a common species locally along the Mad River. This species seems to prefer more sunny areas than the Red-legged Frog. It is found downstream at least to the Water District parks, but may avoid the coastal fog zone.

During the course of the field surveys, Yellow-legged Frogs were found in small ponds, edgewaters and larger ponds adjacent to the river. No Yellow-legged Frogs were found in the river itself. Likewise on the Eel and Mattole Rivers during other field surveys by Mad River Biologists, Yellow-legged Frogs were typically found in quiet waters adjacent to the rivers, including small ponds and puddles. Many tadpoles were also found in these habitats, indicating that our local Yellow-legged Frogs are capable of breeding in quiet waters and may even prefer them -- in contrast to the habitat preferences of this species in other parts of California.

In inland portions of the Eel River, the Yellow-legged Frog has been replaced by the introduced Bullfrog, but no Bullfrogs were found in the study area during these surveys.

Bullfrog (*Rana catesbeiana*)

The Bullfrog has been introduced in California and now is found in almost all aquatic habitats excepting the high mountains and deserts. It prefers permanent waters, especially with well-developed vegetation and muddy bottoms. It is highly aquatic and rarely ventures from water. The breeding season depends on the particular site but can be anytime from February to July. Anywhere from 10,000-20,000 eggs are laid in a mass. Larvae may not transform into adults until the second year of life. The Bullfrog has a varied diet that includes insects and other invertebrates, fish, small reptiles, birds, small mammals and other amphibians. Its habit of eating other frogs has caused a decline in both red-legged and Yellow-legged Frogs in the West, and its presence is a significant part of the reason that the latter two species are of special concern.

The Bullfrog is a Harvest Species in California that is managed by California Fish and Game.

Bullfrogs are widespread and seemingly becoming more common along the north coast. This species was not detected in the study area during this season's field season. It is recommended that any records of Bullfrogs along the Mad River be brought to the attention of wildlife biologists associated with the management of the lower Mad River.

Management recommendations concerning the Bullfrog are geared towards reducing its population. Elsewhere, Bullfrog management has been suggested as a mitigating measure for disturbance to red and Yellow-legged Frog populations. Depending on the future discovery of Bullfrogs in the study area, similar activities may be suggested here.

Northwestern Pond Turtle (*Clemmys marmorata marmorata*)

The Western Pond Turtle is the only native aquatic turtle in California. It is widely distributed west of the Sierra-Cascade Mountains. Pond Turtles are found near and in water, especially slow moving or quiet waters, primarily ponds, small lakes, reservoirs and quiet streams and rivers. They can be found basking on rocks, logs or on the bank along aquatic vegetation. Basking sites appear to be an important component of their habitat needs. Females lay a clutch of 5-11 eggs between April and August in a small hole in a dirt bank, sometimes at a distance from her home water. The diet of Pond Turtles consists of aquatic plants, fish, invertebrates and carrion.

The Northwestern Pond Turtle is considered a Species of Special Concern in California and is a Category 2 Candidate for Federal Listing.

Along the north coast of California, the Pond Turtle is sparsely distributed, mainly at ponds in the interior. Its status along the Mad River still needs documenting. It is apparently found downstream at least to the Blue Lake bridge area (miscellaneous anecdotal reports). This species, like the Yellow-legged Frog, seems to prefer sunny areas and so may avoid the coastal fog belt. None were found during the field surveys of this study.

Any management recommendations or mitigation measures for the Northwestern Pond Turtle will depend on future documentation of this species' occurrence in the study area.

Double-crested Cormorant (*Phalacrocorax auritus*)

The Double-crested Cormorant is a widely distributed species throughout North America. It is the only cormorant to occur regularly in fresh water habitats. Breeding takes place in colonies on islands (especially in ocean environments) or in stands of large trees, often in riparian areas. Food consists of mainly of fish and invertebrates, especially crustaceans.

The Double-crested Cormorant is a Species of Special Concern in California.

In the study area, Double-crested Cormorants are common along the Mad River throughout the year. There are no known nesting areas in the study area. The nearest nesting sites are on the abandoned Arcata Wharf in Humboldt Bay and along sea stacks in and around Trinidad Harbor north of the Mad River mouth.

Management recommendations and mitigation activities for Double-crested Cormorant populations in the study area consist of maintaining a healthy river habitat for fish and other components of the cormorant's diet.

Bald Eagle (*Haliaeetus leucocephalus*)

The Bald Eagle is found throughout North America and California. Concentrations of Bald Eagles are found where their preferred food is concentrated, i.e. in major waterfowl wintering areas and along major salmon streams and rivers with adjacent snags for perching. Nesting takes place in large stick nests, often high in a tree, living or dead. Eggs can be laid as early as January, incubation is 30-45 days and the young take their first flight approximately 2 and 1/2 months after hatching. Their food consists largely of fish, either caught themselves or stolen from Ospreys. Bald Eagles also feed upon a wide variety of small mammals, aquatic birds and even carrion.

The Bald Eagle is listed as endangered both in California and the United States. It is a California Protected Species.

Bald Eagles are rare in Humboldt County. Three nests are known in the county, one of which is above Korbel in the present study area. Scattered sightings of Bald Eagles along the coastal portion of the Humboldt Bay area may refer to this pair and its offspring, or the occasional visitor from elsewhere.

Bald Eagles were detected twice during the formal portions of these field surveys, including an adult and imm. together 24 January and an adult 17 June, both along the river at the Emmerson Bar. Other sightings of Bald Eagles were reported by many observers around Humboldt Bay and Stone Lagoon during this summer (Redwood Region Audubon Society *Sandpiper*, August 1993). These sightings probably are associated with the active nest at the upper end of this study area.

Disturbance to the nest should obviously be avoided. At the present, gravel operations do not take place near the known nest. Site-specific recommendations should be developed in the event of new operations near the nest area. In addition, care must be taken to preserve the integrity of salmon and steelhead habitat in the study area as these are the main food sources for Bald Eagles locally. Maintaining resting and feeding perches in large trees along the river should also be done.

Sharp-shinned Hawk (*Accipiter striatus*)

The Sharp-shinned Hawk is found throughout North America. It is found in a wide variety of forested and scrub habitats where it preys primarily on small birds. Populations in North America have declined due to pesticide residues, habitat destruction and the general decline of songbird populations, its major prey.

The Sharp-shinned Hawk is a Species of Special Concern in California.

Locally, the Sharp-shinned Hawk is an uncommon winter resident and rare summer breeder. No Sharp-shinned Hawks were detected during these surveys, but they are regularly encountered during the wintertime.

Management recommendations would depend on the location of nests and would consist of reducing or eliminating disturbance during the nesting season. In general, riparian habitats, which support song bird populations, should be protected for the health of this species.

Cooper's Hawk (*Accipiter cooperi*)

The Cooper's Hawk is found throughout North America. It is found in a wide variety of forested and scrub habitats where it preys primarily on songbirds. Populations in North America have declined due to pesticide residues, habitat destruction and the general decline of songbird populations, its major prey.

The Cooper's Hawk is a Species of Special Concern in California.

Locally, the Cooper's Hawk is an uncommon winter resident and rare summer breeder. No Cooper's Hawks were detected during the course of this study.

Management recommendations would depend on the location of nests and would consist of reducing or eliminating disturbance during the nesting season. In general, riparian habitats, which support song bird populations, should be protected for the health of this species.

Merlin (*Falco columbarius*)

The Merlin is found throughout North America. It is found in a wide variety of open habitats where it preys primarily on shorebirds and song birds. Populations in North America have declined due to pesticide residues and habitat destruction.

The Merlin is a Species of Special Concern in California.

Locally, the Merlin is an uncommon winter resident that occasionally hunts along the lower stretches of the Mad River where it preys on Pine Siskins and other small birds.

Management recommendations consist of protecting riparian habitats, which support song bird populations.

American Peregrine Falcon (*Falco peregrinus anatum*)

The Peregrine Falcon is found throughout North America. It is often found in aquatic habitats where it preys primarily on water birds, both shorebirds and ducks. Populations in North America have declined due to pesticide residues, nest disturbances (including the illegal removal of chicks for falconry) and habitat destruction. There seems to be some recovery of the species recently.

The Peregrine Falcon is an Endangered Species in California and the United States and is a California Protected Species.

Locally, the Peregrine Falcon is an uncommon winter resident and rare summer breeder. It is fairly common in the lower reaches of the Mad River (e.g. below the 299 bridge) where it hunts for shorebirds along the river and in the adjacent fields. None were detected during the course of this study.

Management recommendations would depend on the location of nests in the study area, none of which are known to date.

Marbled Murrelet (*Brachyramphus marmoratus*)

The Marbled Murrelet is an uncommon and reportedly declining marine bird that depends on old growth forests for their nesting sites. It is distributed between Alaska and northern California.

The Marbled Murrelet is a California Endangered and Federal Threatened species.

There are no records of Marbled Murrelets in the study area or anywhere along the Mad River drainage (Paton and Ralph, 1990). Suitable habitat for Marbled Murrelet does not occur within 0.25 miles of any present operation. New gravel operations upstream from the Blue Lake Hatchery could require Marbled Murrelet surveys.

Northern Spotted Owl (*Strix occidentalis caurina*)

The Northern Spotted Owl is an uncommon and reportedly declining species of old growth forests in the Pacific Northwest. Its habitat is in old-growth or older second growth forests.

The Northern Spotted Owl is a California Threatened Species.

Near the study area, Spotted Owls are locally common in suitable habitat. None are known in habitat adjacent to the present gravel operations. A search of the California Department of Fish and Game Natural Diversity Data Base reveals no records in the vicinity of present operations. Data from the Arcata Christmas Bird count indicate no known Spotted Owls in the lower half of the study area.

None of the present gravel mining operations would impact Spotted Owls as suitable habitat is lacking within 0.25 miles of operations. New gravel operations upstream from the Blue Lake Hatchery could require Spotted Owl surveys.

Willow Flycatcher (*Empidonax trailii*)

The Willow Flycatcher is found throughout the northern half of the continental United States. Its preferred habitat is wet meadow and montane riparian habitats dominated by willow thickets. The Willow Flycatcher breeds almost exclusively in dense willow thickets, using the lower branches for feeding and singing perches. This species nests are parasitized by the Brown-headed Cowbird, a significant part of the reason for its California listing.

The Willow Flycatcher is a California Endangered Species.

In Humboldt County the Willow Flycatcher is not yet known to nest, although singing males exhibiting territorial behavior have been noted along the Eel River near Dyerville.

Willow Flycatchers were not recorded during this season's surveys, in spite of intensive searching. In general, the protection and maintenance of healthy riparian habitats, especially the early seral stages with willow thickets, is important. Future surveys during June should be performed on an annual basis.

Black-capped Chickadee (*Parus atricapillus*)

The Black-capped Chickadee is possibly the most abundant and best-known chickadee in North America. In California it is found almost exclusively in willow/cottonwood habitats along the north coast south to the vicinity of Ferndale.

The Black-capped Chickadee is a Species of Special Concern in California

It is fairly common along the Mad River from the Mad River County Park upstream in suitable habitat to at least the Blue Lake Hatchery. It was recorded throughout the study area.

Management recommendations for this species would center around the maintenance of healthy riparian woodland.

California Yellow Warbler (*Dendroica petechia brewsteri*)

Found throughout North America, the Yellow Warbler has been declining as a breeding bird in California due to habitat destruction and parasitization by the Brown-headed Cowbird. Its breeding habitat is in riparian deciduous forests of almost any size.

The Yellow Warbler is a Species of Special Concern in California.

In Humboldt County the Yellow Warbler is a fairly common breeder in riparian habitats including the riparian forests downstream from the Blue Lake bridge.

Management recommendations consist of maintaining healthy riparian woodlands.

Yellow-breasted Chat (*Icteria virens*)

Found throughout North America, the Yellow-breasted Chat has been declining as a breeding bird in California due to habitat destruction. Its breeding habitat is in riparian deciduous forests of moderate or larger size.

The Yellow-breasted Chat is a Species of Special Concern in California.

In Humboldt County the Yellow-breasted Chat is an uncommon breeder in riparian habitats including the riparian forests downstream to at least the area below Azalea Park.

Management recommendations consist of maintaining healthy riparian woodlands.

White-footed Vole (*Arborimus albipes*)

The White-footed Vole is found along the coastal regions of Oregon and extreme northern California. Its preferred habitat is humid coastal forests of Redwood, Douglas-fir and riparian species. White-footed Voles feed principally on the leaves of green plants; red alder seems to be preferred in some areas.

The White-footed Vole is a Species of Special Concern in California and is a Category 2 Candidate for Federal Listing.

Locally this species is not well known, but seems to prefer riparian vegetation along small streams within the coastal coniferous forests. This species is not expected in the Cottonwood/willow riparian forests of the study area.

Management recommendations again center on the maintenance of healthy riparian habitats.

V. Site Specific Considerations

The following site descriptions are intended to discuss the wildlife values of the various sites. Species lists following each site are those detected during the course of this study. These species lists necessarily include species detected in adjacent habitat, not just those on the gravel operation sites themselves. Underlined species are those that appear in Table 1 Species of Special Concern.

Site No. 1 - Guynup Bar

This is a large gravel bar with significant stands of riparian habitat along the adjacent southern bank upstream from the operation site. This riparian extends along the bank of the river downstream to another significant stand between the Guynup Bar and the Emmerson Bar. There is also riparian vegetation along the north bank directly across from the gravel processing site. These riparian habitats are extremely valuable for wildlife.

Adjacent to the upper end of the extraction area (and actually on Site No. 10 -- Simpson Bar) is a stand of developing riparian habitat. The downstream edge of that stand appears to be eroding as a result of 'knick-point' erosion. The future of this riparian could be affected by continued gravel mining on the immediate downstream gravel bar.

There is standing water along the base of the south bank below and slightly downstream from the processing yard that hosts breeding amphibians including Yellow-legged Frogs, Western Toads and Tree Frogs. This appears to be a remnant channel that has significant aquatic vegetation and has qualities that indicate that it is a long-standing pond. During June, there were also ephemeral ponds along the base of the gravel stockpiles and under the truck scale that supported Yellow-legged Frogs and Tree Frogs. These were completely dry by the end of August but some of them supported a small growth of cattails. During June a trench (maybe referred to as the irrigation channel?), lacking vegetation, had many tadpoles and two small frogs, probably Yellow-legged.

Management considerations at this site include protection of the existing riparian habitat and the pond formed by the remnant channel. Further consideration should be made to protecting the developing riparian on the upstream end of the bar. This could influence the amount and method of gravel mining on this site.

Species Detected

Green-backed Heron
Mallard
Red-shouldered Hawk
Red-tailed Hawk
California Quail
Killdeer
Spotted Sandpiper
Mourning Dove
Anna's Hummingbird
Allen's Hummingbird
Belted Kingfisher
Downy Woodpecker
Western Wood-pewee
Pacific-slope Flycatcher
Black Phoebe
Northern Rough-winged Swallow
Cliff Swallow
American Crow
Common Raven
House Wren
Swainson's Thrush
Wrentit
Cedar Waxwing
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Black-throated Gray Warbler
Wilson's Warbler
Yellow-breasted Chat
Black-headed Grosbeak
Lazuli Bunting
Song Sparrow
White-crowned Sparrow
Brewer's Blackbird
Brown-headed Cowbird
Bullock's Oriole
American Goldfinch
Western Toad
Pacific Treefrog
Foothill Yellow-legged Frog
Western Fence Lizard
Raccoon

Site No. 2 - Emmerson Bar

This is a large gravel bar with valuable riparian habitat on both the upstream end along the south bank and downstream below the Blue Lake bridge. A narrow strip of riparian exists along Hatchery Road connecting these two patches. There is a more-or-less permanent pond along hatchery road near the Blue Lake bridge. This site receives a lot of use from off-road vehicle activity that may do as much damage to vegetation and wildlife as any gravel mining operations.

The river's main course has moved towards the north bank here, capturing what was a backwater in 1992. The upstream end of Emerson Bar on the south bank has significant bank erosion, with large cottonwoods falling into the river contributing much woody debris.

The pond is valuable for wildlife, with a number of amphibian and reptile species recorded. The riparian habitat adjacent to the pond (even though separated from it by Hatchery Road) allows easy access to the ponds by wildlife using both habitats. This pond had a lot of cattails (*Typha sp.*) indicating that it stays wet throughout most of the year, but the surface water had mostly dried up by mid-June.

The riparian habitat downstream from the bridge is valuable wildlife habitat. It has been a traditional bird-watching site and is used in many other ways, including garbage dumping, off-road vehicle activity and fishing access. A stockpile of gravel exists within the riparian forest along the access road. The riparian along Hatchery Road upstream from the bridge had hidden campsites.

Management recommendations here include some control over the off-road vehicle, camping and dumping activities in addition to the protection of the riparian habitat. The riparian forest downstream from the bridge would be a convenient site for any future management for passive recreation, i.e. picnicking, birdwatching and walking.

Species Detected

Double-crested Cormorant
Great Blue Heron
Great Blue Heron
Green-backed Heron
Bald Eagle
Turkey Vulture
California Quail
Killdeer
Spotted Sandpiper
Band-tailed Pigeon
Mourning Dove
Allen's Hummingbird
Belted Kingfisher
Western Wood-pewee
Pacific-slope Flycatcher
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
American Crow
Common Raven
Black-capped Chickadee
Bushtit
Swainson's Thrush
Wrentit
Cedar Waxwing
European Starling
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Black-throated Gray Warbler
Wilson's Warbler
Yellow-breasted Chat
Black-headed Grosbeak
Song Sparrow
White-crowned Sparrow
Brewer's Blackbird
Brown-headed Cowbird
Bullock's Oriole
House Finch
Lesser Goldfinch
American Goldfinch
Rough-skinned Newt
Pacific Treefrog
Western Fence Lizard
Southern Alligator Lizard
Western Aquatic Garter Snake
Botta's Pocket Gopher
Beaver
Raccoon
Mule Deer

Site No. 3 -- Blue Lake Bar

This site has a mixture of open gravel bar, developing riparian forest and mature riparian forests. The riparian habitat supports a wide variety of species including Black-capped Chickadee, Yellow Warbler and Yellow-breasted Chat.

The pond created in 1992 hosted Yellow-legged Frogs in both June and August. A single Red-legged Frog was found here in August. The pond is quite steep-sided, consequently little aquatic

vegetation has taken root. Also the steep sides make it difficult to determine whether the frogs were breeding as no tadpoles were found during either visit.

Puddles along the edge of the developing riparian had both adult and tadpole Yellow-legged frogs and western toads.

A fair amount of the riparian out on the gravel bar survived the winter flows of 1992-93. The riparian vegetation here could develop into more extensive mature forest increasing its value to wildlife.

Management recommendations at this site would be to protect the small stands of mature riparian forests and the patches of developing riparian. Mining operations should be conducted in such a way to minimize the effect on the parts of the gravel bar that have the developing riparian.

The introduction of a small amount of appropriate aquatic vegetation to the pond could enhance its use by wildlife, especially amphibians.

Species Detected

Great Blue Heron
Great Egret
Killdeer
Spotted Sandpiper
Band-tailed Pigeon
Allen's Hummingbird
Downy Woodpecker
Western Wood-pewee
Ash-throated Flycatcher
Tree Swallow
Northern Rough-winged Swallow
Cliff Swallow
Barn Swallow
American Crow
Common Raven
Chestnut-backed Chickadee
Bushtit
Bewick's Wren
Swainson's Thrush
Cedar Waxwing
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Yellow-breasted Chat
Lazuli Bunting
Song Sparrow
White-crowned Sparrow
Bullock's Oriole
Purple Finch
House Finch
American Goldfinch
Western Toad
Foothill Yellow-legged Frog
Raccoon
Domestic Cat
Mule Deer
Feral Dog

Site No. 4 -- Christie Bar

The large gravel bar is bordered on the north (adjacent to the processing and stockpiling site) by a moderate-sized stand of mature riparian forest. This forest is valuable for wildlife as illustrated by the 51 species detected during the two visits (second highest of all the sites visited).

A surprising number of the willows survived the winter flows along the outer bar.

Two ponds have been constructed during the past four years, one of which (the upstream site) does not hold water. There is very little vegetation along the edge of the existing pond and its steep sides, like the pond on Blue Lake Bar, makes it difficult to determine if frogs are breeding in it. No amphibians were found around this pond.

The isolated cottonwood patch at the upstream end of the bar is eroding into the river and providing good riverine habitat. Many game trails are evident in the patch, and a pond near this stand had Yellow-legged frog tadpoles in June.

There is a lot of off-road vehicle and horse riding use of this site.

Management recommendations at this site would be to protect the mature riparian forests and the patches of developing riparian. Mining operations should be conducted in such a way to minimize the effect on the parts of the gravel bar that have the developing riparian.

The introduction of a small amount of appropriate aquatic vegetation to the pond could enhance its use by wildlife, especially amphibians. The introduction of Red-legged Frogs might be considered for the pond if no amphibian use develops in the next year or two.

Species Detected

Double-crested Cormorant
Great Blue Heron
Great Egret
Mallard
Turkey Vulture
Osprey
Red-shouldered Hawk
California Quail
Spotted Sandpiper
Ring-billed Gull
Allen's Hummingbird
Belted Kingfisher
Downy Woodpecker
Red-shafted Flicker
Olive-sided Flycatcher
Western Wood-pewee
Pacific-slope Flycatcher
Black Phoebe
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
Cliff Swallow
American Crow
Common Raven
Chestnut-backed Chickadee
Swainson's Thrush
American Robin
Wrentit
Cedar Waxwing
European Starling
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Wilson's Warbler
Black-headed Grosbeak
Lazuli Bunting
Song Sparrow
White-crowned Sparrow
Brown-headed Cowbird
Bullock's Oriole
Lesser Goldfinch
American Goldfinch
Western Toad
Foothill Yellow-legged Frog
Western Fence Lizard
Southern Alligator Lizard
Beaver
Raccoon
Mule Deer
Feral Dog

Site No. 5 -- Johnson Bar

This is a relatively narrow bar at the junction of Mill Creek and the Mad River. There is a narrow band of riparian along the north bank of the river that may serve as a corridor for wildlife passing along the river's edge. There are significant edgewaters formed by the junction of Mill Creek and the river that have some emergent vegetation and many small fish. No amphibians were found during these surveys, but the habitat looks typical for Yellow-legged Frog.

Management considerations for this site center around the maintenance of the riparian vegetation and the protection of the edgewaters at the mouth of Mill Creek/

Species Detected

Green-backed Heron
Spotted Sandpiper
Belted Kingfisher
Northern Flicker
Olive-sided Flycatcher
Pacific-slope Flycatcher
Violet-green Swallow
Northern Rough-winged Swallow
Steller's Jay
American Crow
Chestnut-backed Chickadee
Swainson's Thrush
Orange-crowned Warbler
Wilson's Warbler
Yellow-breasted Chat
Black-headed Grosbeak
Lazuli Bunting
White-crowned Sparrow
American Goldfinch

Site No. 6 -- Essex Bar

The Essex, or Mercer-Fraser, Bar is mostly an upper terrace with sparse weedy cover used for storage of materials. There is a narrow band of vegetation along the river bank. The small extraction area contained one small puddle behind a 'breakwater' but no amphibians were present in June.

The adjacent Humboldt Bay Municipal Water District yard has a deep pit that was surrounded by large alders until they were fallen this winter. The pit area was not accessible during the summer field visits.

Management considerations for this site relative to wildlife are minimal.

Species Detected

Double-crested Cormorant
Mallard
Red-tailed Hawk
Spotted Sandpiper
Allen's Hummingbird
Black Phoebe
Tree Swallow
Cliff Swallow
Barn Swallow
Steller's Jay
Chestnut-backed Chickadee
American Robin
Cedar Waxwing
Orange-crowned Warbler
Wilson's Warbler
Song Sparrow
White-crowned Sparrow
American Goldfinch
Raccoon
Mule Deer
Feral Dog

Site No. 7 -- Johnson-Spini Bar

The Johnson-Spini Bar consists of a large gravel bar downstream of the Highway 299 bridge over the Mad River. There is a small strip of riparian forest along the south bank of the river. During the 1992-93 winter, the river's main channel followed the south bank and essentially abandoned the channel that bisectedthe gravel bar during the previous year. The existing channel is used extensively by beaver and river otter. The river otters appear to be using the shelter of a large buried redwood root mass for shelter and possibly a den. The only amphibians found in the river were thousands of toad tadpoles during August.

Management considerations for this site would be simply to minimize disturbance to the otters, possibly by placing the summer bridge as far away from the potential denning site as practical.

Species Detected

Double-crested Cormorant
Great Blue Heron
California Quail
Killdeer
Spotted Sandpiper
Red-shafted Flicker
Pacific-slope Flycatcher
Black Phoebe
Barn Swallow
Steller's Jay
American Crow
Black-capped Chickadee
Chestnut-backed Chickadee
American Robin
European Starling
Orange-crowned Warbler
Song Sparrow
White-crowned Sparrow
American Goldfinch
Western Toad
Beaver
Raccoon
River Otter

Site No. 7B -- Arcata Readimix Bar

The Arcata Readimix Bar is immediately downstream of the Johnson -Spini Bar. There is very little in the way of riparian vegetation on this site, nonetheless, both otter and beaver workings and tracks were evident during field investigations during January, June and August.

Management considerations for this site relative to wildlife are minimal.

Species Detected

Great Blue Heron
Common Merganser
Red-shouldered Hawk
California Quail
Killdeer
Spotted Sandpiper
Pacific-slope Flycatcher
Black Phoebe
Northern Rough-winged Swallow
Barn Swallow
American Crow
Chestnut-backed Chickadee
European Starling
Song Sparrow
White-crowned Sparrow
Western Toad
Beaver
River Otter
Feral Dog

Site No. 8 -- Graham-Zanzi Bar

The Graham Bar borders some of the finest riparian habitat in the study area, that between the river and North Bank road below Azalea Park. Fifty-seven species of wildlife were detected during this investigation, much of it owing to the high quality of the north bank's riparian. Much of the riparian forest has a low-lying wetland understory with well-developed aquatic vegetation. Unfortunately, much of this riparian forest has been logged (for firewood?) during the past five years.

There is a lot of wildlife activity along the north bank of the river including otter tracks and beaver workings. Puddles along the river's edgewater hosted thousands of toad tadpoles during July.

The primary management considerations for this site would be to protect the quality of the riparian habitat across the river from the gravel mining site.

Species Detected

Double-crested Cormorant
Great Blue Heron
Common Merganser
Turkey Vulture
Osprey
Red-shouldered Hawk
Red-tailed Hawk
California Quail
Killdeer
Spotted Sandpiper
Mourning Dove
Vaux's Swift
Allen's Hummingbird
Downy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Western Wood-pewee
Pacific-slope Flycatcher
Black Phoebe
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
Cliff Swallow
Barn Swallow
Steller's Jay
American Crow
Common Raven
Chestnut-backed Chickadee
Bewick's Wren
Swainson's Thrush
American Robin
Wrentit
Cedar Waxwing
European Starling
Hutton's Vireo
Warbling Vireo
Orange-crowned Warbler
Wilson's Warbler
Yellow-breasted Chat
Western Tanager
Black-headed Grosbeak
Song Sparrow
White-crowned Sparrow
Brewer's Blackbird
Brown-headed Cowbird
Bullock's Oriole
Pine Siskin
American Goldfinch
House Finch
Western Toad
Brush Rabbit
Beaver
Gray Fox
Raccoon
River Otter
Mule Deer
Feral Dog

Site No. 9 -- Simpson-Zabel Bar

The Simpson Bar is a moderately-sized gravel bar just upstream from the railroad bridge. There are strips of riparian habitat along the banks of the river forming corridors for wildlife moving up and down river. Edgewater pools under the railroad bridge and along the upstream end of the Mill Creek mouth (adjacent to the Johnson Bar) had no tadpoles or other signs of amphibians, but appear to be good Yellow-legged Frog habitat.

Management considerations for wildlife center on maintaining the existing riparian vegetation.

Species Detected

Great Blue Heron
Snowy Egret
Green-backed Heron
Mallard
Common Merganser
Turkey Vulture
Spotted Sandpiper
Killdeer
Band-tailed Pigeon
Red-shafted Flicker
Western Wood-pewee
Pacific-slope Flycatcher
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
Steller's Jay
American Crow
Common Raven
Chestnut-backed Chickadee
Swainson's Thrush
Wrentit
Cedar Waxwing
Warbling Vireo
Orange-crowned Warbler
Wilson's Warbler
Black-headed Grosbeak
Song Sparrow
White-crowned Sparrow
Brown-headed Cowbird
Bullock's Oriole
American Goldfinch
Striped Skunk
Raccoon
Feral Dog

Site No. 10 -- Simpson Bar

This Simpson Bar is the furthest upstream extraction site. There is extensive valuable riparian vegetation on the south bank of the river (more accurately the west side, as the river flows from south to north here) below the Mad River Fish Hatchery. The identified extraction site along the south bank is an area of developing riparian scrub that appears to be eroding as a result of 'knick-point' erosion. The future of this riparian would be affected by gravel extraction on this site. This is the same site discussed under Site No. 1 -- Guynup Bar.

The north (east) bank of the river is eroding and the dirt bank is providing nesting habitat for Rough-winged Swallows and Belted Kingfisher.

Management considerations here center around the valuable riparian habitat and the developing riparian stand.

Species Detected

Belted Kingfisher
Pacific-slope Flycatcher
Rough-winged Swallow
Steller's Jay
Chestnut-backed Chickadee
Swainson's Thrush
Solitary Vireo
Orange-crowned Warbler
Macgillivray's Warbler
Wilson's Warbler
Yellow-breasted Chat
White-crowned Sparrow
Lesser Goldfinch

VI. General Management Recommendations

As stated numerous times in the **Site Specific Considerations,** protection of riparian forests of all stages, including developing riparian is the most overriding element of ensuring good wildlife populations in the project area. It is therefore recommended that no riparian habitat be removed and that disturbance to the riparian habitats as a result of the extraction operations be minimized. To accomplish these goals, no new roads should be built through riparian habitat, existing roads should be watered appropriately during use to minimize problems associated with dust, and great care should be taken to prevent oil, fuel, and other waste products of the operation procedure from being disposed of on-site.

Given the value and almost random distribution of the ephemeral ponds (those of temporary nature) to amphibians and other wildlife,, operations should to the extent possible avoid disturbing these sites. This could be accomplished either by operating late in the season when these ponds have dried up, or operating after consultation with a wildlife biologist qualified to identify sites being used by wildlife.

Impact on all permanent (or those that have water in them annually for most of the year) ponds should be avoided. In the event that an existing ponded area shall be disturbed, mitigation should include the creation of a similar site. Introduction of appropriate aquatic vegetation and possibly even red-legged frogs should be considered for the man-made ponded habitats.

Despite the absence of yellow-legged frogs in the riverine habitat during this season's field surveys, management recommendations would still include avoidance of disturbance of riffle habitat during the amphibian breeding season, i.e. April through June.. Furthermore, any activities that would increase silting in the river during the late spring and early summer could be damaging to larval and transforming young frogs and should be avoided

In general, operations should be designed to minimize the disruption of natural river events. Where disruption is necessary, the operation should be designed to mimic naturally occurring events when possible. As a last resort, operations should be designed to create mitigating habitat elsewhere, e.g. the creation of ponds through pit mining.

BIRDS (cont.)

SPECIES	W	Sp	Su	F	HAB.
Bl.-throated Gray Warbler		X	R	X	F
Townsend's Warbler	X	X		R	F
Palm Warbler	R			R	F
Macgillivray's Warbler		B	B	X	F
Common Yellowthroat		RB	RB	R	F
Wilson's Warbler		B	B	X	F
Yellow-breasted Chat		RB	RB		F
Western Tanager		R	R		F
Black-headed Grosbeak		B	B	X	F
Lazuli Bunting		RB	RB		A
Rufous-sided Towhee	X	B?	B?	X	F
Chipping Sparrow		B	B	R	A
Savannah Sparrow	R	R	R	R	A
Fox Sparrow	X	X		X	F
Song Sparrow	X	B	B	X	FP
Lincoln's Sparrow	X	R		R	F
Swamp Sparrow	R				P
White-throated Sparrow	R			R	F
Golden-crowned Sparrow	X	X		X	F
White-crowned Sparrow	X	RB	RB	X	F
Dark-eyed Junco	X	B	B	X	F
Red-winged Blackbird	X	B	B	X	F
Western Meadowlark	X	B	B	X	A
Brewer's Blackbird	X	B	B	X	AG
Brown-headed Cowbird		B	B	X	A
Northern Oriole		B	B		F
Purple Finch	X	B	B	X	F
House Finch	X	B	B	X	F
Pine Siskin	X	B	B	X	F
Lesser Goldfinch	R	B	B	X	F
American Goldfinch	X	B	B	X	F
Evening Grosbeak	R	R		R	F

AMPHIBIANS

SPECIES	W	Sp	Su	F	HAB.
Northwestern Salamander	X	X	X	X	F
Pacific Giant Salamander	X	X	X	X	F
Rough-skinned Newt	X	X	X	X	F,P
Ensatina	X	X	X	X	F
California Slender Salamander	X	X	X		F
Black Salamander	X	X	X	X	F
Clouded Salamander	X	X	X	X	F
Western Toad	X	X	X	X	F,R,P,G
Pacific Treefrog	X	X	X	X	F,P
Red-legged Frog	X	X	X	X	F,P
Foothill Yellow-legged Frog	X	X	X	X	F,P,R,G
Bullfrog	?	?	?	?	F,P,R

REPTILES

SPECIES	W	Sp	Su	F	HAB.
Western Pond Turtle	X	X	X	X	R,P
Western Fence Lizard	X	X	X	X	F
Western Skink	X	X	X	X	F
Northern Alligator Lizard	X	X	X	X	F
Rubber Boa	X	X	X	X	F
Ringneck Snake	X	X	X	X	F
Racer	X	X	X	X	F
Gopher Snake	X	X	X	X	F
Common Garter Snake	X	X	X	X	F,R,P
Western Terrestrial Garter Snake	X	X	X	X	F
Western Aquatic Garter Snake	X	X	X	X	F,R,P
Western Rattlesnake	X	X	X	X	F

MAMMALS

SPECIES	W	Sp	Su	F	HAB.
Virginia Opossum					FG
Vagrant Shrew					F
Pacific Shrew					F
Marsh Shrew					F
Trowbridges Shrew					F
Shrew-mole					F
Townsend's Mole					F
Coast Mole					F
Little Brown Myotis					F
Yuma Myotis					F
Long-eared Myotis					F
Fringed Myotis					F
California Myotis					F
Silver-haired Bat					F
Big Brown Bat					F
Hoary Bat					F
Townsend's Big-eared Bat					F
Brush Rabbit					F
Black-tailed Jackrabbit					FG
Mountain Beaver					A
California Ground Squirrel					F
Western Gray Squirrel					F
Douglas Squirrel					A
Botta's Pocket Gopher					FG
Beaver					FR
Western Harvest Mouse					F
Deer Mouse					F
Dusky-footed Woodrat					F
Western Red-backed Vole					A
White-footed Vole					A
Townsend's Vole					A
Long-tailed Vole					A
Creeping Vole					A
Black Rat					FR
Norway Rat					F
House Mouse					F
Pacific Jumping Mouse					F
Porcupine					F
Coyote					FG
Gray Fox					FG
Black Bear					FG
Ringtail					F
Raccoon					FGR
Ermine					F
Long-tailed Weasel					F
Mink					FR
Western Spotted Skunk					F
Striped Skunk					F
River Otter					R
Mountain Lion					FA
Bobcat					A
Elk					A
Mule Deer					R