Draft Supplemental Programmatic Environmental Impact Report for Gravel Extraction on the Lower Mad River
VOLUME II: APPENDICES

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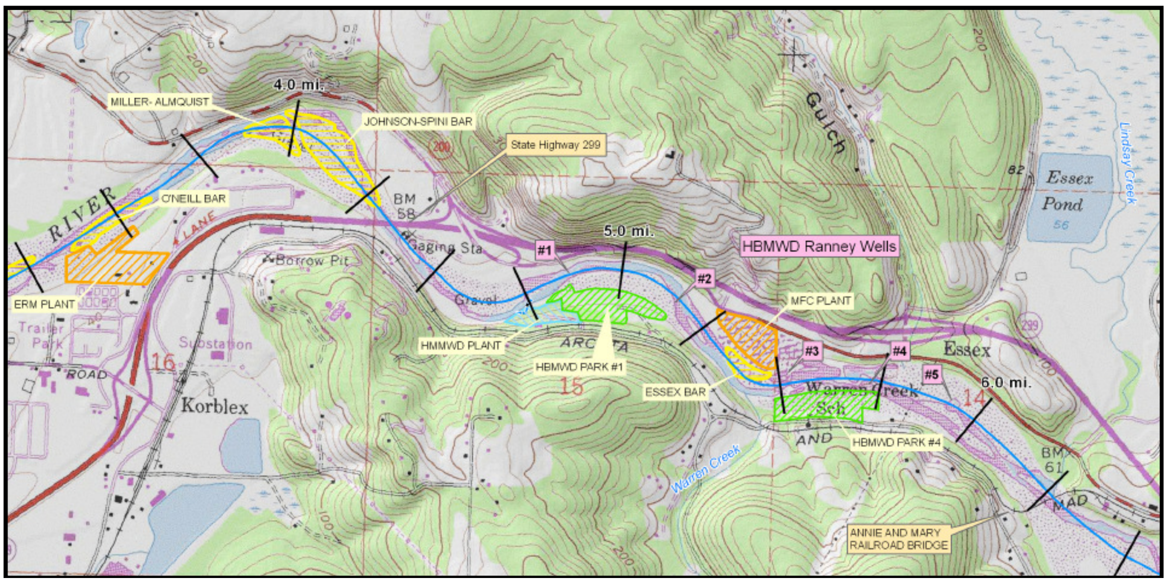

April 2014

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APPENDIX A.

Comments on September 2007 Notice of Preparation
and
Comments on 2009 Draft Programmatic Supplemental EIR

Appendix A contains the comments received on the September 2007 Notice of Preparation. The parties commenting were:

- Ed Voice, Voice Family
- Kristen Lark, Friends of Small Places
- Diana Henrioulle-Henry, Regional Water Quality Control Board, North Coast Region
- Scott Bauer, California Department of Fish and Game (includes County response to comments)
- Leslie Wolff, National Marine Fisheries Service

Appendix A also contains comments received on the 2009 Draft Supplemental Programmatic EIR. Parties commenting were:
The City of Blue Lake
April Walton
California Department of Transportation
California Office of Planning and Research
The Native American Heritage Commission
National Marine Fisheries Service
California Department of Fish and Game
US Army Corps of Engineers

Mr. Michael Wheeler,

After reading all available information for the Mad River PEIR, we have the following comments. The Voice Family would like to emphasize how important it is, to include more information about instream gravel extraction and the effects this has on water quality with-in the watershed environment. We believe that these operations are inconsistent with the intended protection of the water quality of the Mad River, resulting in impacts to significant biological resources and the degradation of the beneficial uses found there.

DEFINITIONS OF ADAPTIVE MANAGEMENT

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Its most effective form–"active" adaptive management–employs management programs that are designed to experimentally compare selected policies or practices, by evaluating alternative hypotheses about the system being managed.

"...is 'learning to manage by managing to learn'..."

"...is an innovative technique that uses scientific information to help formulate management strategies in order to 'learn' from programs so that subsequent improvements can be made in formulating both successful policy and improved management programs."

"...embodies a simple imperative: policies are experiments; *learn from them*."

"...is a policy framework that recognizes biological uncertainty, while accepting the congressional mandate to proceed on the basis of the 'best *available* scientific knowledge'. An adaptive policy treats the program as a set of experiments designed to test and extend the scientific basis of fish and wildlife management."

"The rigorous combination of management, research, and monitoring so that credible information is gained and management activities can be modified by experience. Adaptive policy acknowledges institutional barriers to change and designs means to overcome them."

Position

The mining industry on the Mad River devotes considerable resources to identifying and managing environmental concerns as an integral component of the Mad River PEIR. Clearly mining practices have improved in the past decade. Nonetheless, instream gravel extraction and processing still pose potential environmental threats in spite of improved practices to mitigate environmental concerns. Ongoing and potential environmental impacts posed by both current and historic mining in the Mad River are significant and on-going. The mad River PEIR seeks to address the challenges posed by historic and active instream gravel extraction that result in impacts to significant biological resources and the degradation of the beneficial uses found there. The Adaptive Management Program developed by CHERT will only guide efforts to design and implement a more effective instream gravel extraction program for the operators, not the Mad River. The specific initiatives to be undertaken were to provide both short-term improvements, as well as long-term refocusing of the instream mining restrictions. Three critical themes guide this effort: good science and engineering early in the planning process is essential to managing environmental concerns; priorities must be established (both programmatic and geographic); and finally, CHERT must work in partnership with the public to increase its effectiveness, awareness, support and credibility for the rivers they are to protect.

Due to the numerous credible studies demonstrating environmental degradation that results from instream gravel mining (Knuuti and McComas (2003) Mad River), it is quite probable that the existing instream gravel extraction operations in or near the Mad River and its tributaries have adversely affected fisheries and aquatic communities in those systems. Particularly those species that is already rare or endangered, due to the elimination of suitable habitats and reduction in quantity and quality of food resources.

Minimization or mitigation by CHERT and the effects of instream mining are problematic, if not unlikely. Because the physical structure is the very foundation upon which stream communities are assembled (Brown et al. 1998). Gravel replenishment or recruitment has been used as a technique to mitigate the reduction of sediment (Kondolf 1997), but has not been considered to be a viable option for instream mining sites because of the difficulty in distributing the aggregate naturally and completely throughout the basin prior to the next high water event (Brown et al. 1998). Even when results have been successful below dams, effects are short termed and require continual replenishment efforts (Kondolf 1997). In addition, strategies to minimize impacts are often not effective. Another approach that has been examined is to estimate the annual bedload to determine the "safe sustainable yield". However, there are complications with this approach as well, due to the variability in bedload transport from year to year.

Alternatively, if extraction rates were instead based on the amount of new deposition per year, the channel may remain negatively affected because mining at the replenishment rate is expected to produce sediment-deficient flow conditions downstream, since the upstream area is the sediment source for downstream reaches (Kondolf 1997).

The effects of instream gravel mining may not be obvious immediately because active sediment transport is required for the effects (e.g. incision, instability) to propagate upstream and downstream. Given that geomorphically-effective sediment transport events are infrequent on many rivers, there may be a lag of several or many years before the effects of instream gravel mining are evident and propagate along the channel. This delayed manifestation of geomorphic effects leads to the false assumption that floods cause damage to stream systems, when in actuality anthropogenic changes often "set the stage" for geomorphic change. Large flood events simply provide the necessary stream power for the changes to occur.

Issue

Instream mining operations remove accumulated sand and gravel directly from stream channels in increasingly larger quantities in the U.S. (EPA 1995), primarily for construction and industrial uses. Instream mining is prohibited in the United Kingdom, Germany, France, the Netherlands, and Switzerland and is restricted in select rivers in Italy, Portugal, and New Zealand (Kondolf 1997). In addition, instream mining is not allowed in Saskatchewan or most of Canada (Starnes and Gasper 1996). Sand and gravel are mined commercially in every state in the U.S.; however, due to numerous research studies that have demonstrated long lasting environmental effects from instream mining, many states have imposed strict regulations on instream mining, and some no longer allow it (Roell 1999). Some of the more detrimental effects of instream mining include channel degradation and erosion, headcutting, increased turbidity, stream bank erosion, and sedimentation of riffle areas.

All of these changes can adversely affect fish and other aquatic organisms, either directly by damage to the organisms or through habitat degradation, or indirectly through disruption of the food web. Further, effects on stream geomorphology (e.g., channel incision) can result in infrastructure damage such as undermining bridge piers and exposure of buried pipeline crossings and water supply intakes (Kondolf 1997). Each mining operation not only exerts an individual effect on the stream, but effects of multiple mining operations within a river system may be cumulative. Therefore, individual extraction operations should be evaluated in the context of their spatial and temporal cumulative impacts.

Impacts

Stream Geomorphology

Removal of alluvial materials by instream sand and gravel mining disrupts the balance between sediment supply and transport capacity, typically inducing incision upstream and downstream of the extraction site (Kondolf 1997). The alteration of geomorphic structure may occur due to increased velocity and decreased sediment load associated with mined areas. Excavation in the active channel lowers the streambed, creating a nick point that steepens channel slope and increases velocity (Kondolf 1997). The nick point migrates upstream due to increased water speed, i.e., headcutting. The deposition of sediments at the mine site creates a sediment-deficient flow leaving the site, this in turn results in the water picking up more sediment from the stream reach below the mine site; ultimately resulting in bed degradation downstream.

Both processes can move long distances (as much as 7 river miles) and headcutting can additionally move into tributaries (Kondolf 1997). Channel incision can also cause lateral instability by increasing stream bank heights, resulting in bank failure and additional transport of sediments downstream.

Aquatic and Riparian Habitat

Effects directly related to extraction and to changes in geomorphology include increased sedimentation, turbidity, and bankfull widths (Rosgen 1996), higher stream temperatures, reduced dissolved oxygen, lowered water table, decreased wetted periods in riparian wetlands, and degraded riparian habitat (see reviews by Nelson 1993; NMFS 1996; Meador and Layher 1998; Bork 1999; Roell 1999; and original research by Kanehl and Lyons 1992; Brown et al. 1998; and references therein). Channel geomorphology changes, such as a wider and shallower streambed (Kanehl and Lyons 1992; Brown et al. 1998) may consequently result in increased stream temperature (Kondolf 1997). Although studies have shown differing results, chemical changes such as reduced dissolved oxygen and changes in pH levels have been reported downstream of instream mining areas (Nelson 1993; Meador and Layher 1998). Loss of riparian habitat may result from direct removal of vegetation along the stream bank to facilitate the use of a dragline or through the process of lowering the water table, bank undercutting, and channel incision (Kondolf 1997; Brown et al. 1998).

The physical composition and stability of substrates are altered as a result of instream mining, and most of these physical effects may exacerbate sediment entrainment in the channel. Furthermore, the process of instream mining and gravel washing produces fine sediments under all flow conditions, resulting in a deposition of fine sediment in riffles as well as other habitats at low discharge (Nelson 1993). Excess sediment is considered the greatest pollutant in U.S. waters and constitutes one of the major environmental factors in the degradation of stream fisheries (Waters 1995). Much of the excess sediment is a result of poor watershed and riparian land use. However, instream mining may contribute additional sediment to downstream reaches due to the disruption of substrate stability. Once sediment enters the stream, it is best to let natural geomorphological and hydrological processes reach a dynamic equilibrium, rather than further exacerbating the situation by additional disturbance.

Aquatic Organisms

The distribution of stream biota is strongly related to physical habitat (Brown et al. 1998); therefore, fundamental changes in the total biotic community are to be expected when the physical structure of the stream is altered. Suspended sediments can limit primary production by reducing light penetration (Nelson 1993; Waters 1995), which, in turn, will affect the aquatic food chain and limit production at higher trophic levels. Both fish and aquatic invertebrate abundance may be significantly diminished by direct damage, removal of the substrate, degradation of habitat, riparian habitat removal, reduction in spawning success, reduction in food availability, and clogging and damage of gills (see reviews by Nelson 1993; NMFS 1996)

In addition to the effects of mining activities at the site of extraction, physical and biotic effects can extend far upstream and downstream (Brown et al. 1998). All of these adverse impacts can result in shifts in species composition, decrease in species diversity and abundance, and a loss of sensitive species and ecosystem integrity. The effects of sand and gravel extraction on stream ecosystem recovery time can be extensive. Kanehl and Lyons (1992) found conditions in some stream reaches in Wisconsin to remain in early stages of recovery 20 years after mining had stopped, and other reaches were in worse condition after 10 years. Further, total restoration of severely affected streams has been considered to be improbable (Brown et al. 1998).

Secondary Effects

Instream mining also has secondary consequences. Expansion of a mine site or mining at a new site often is preceded by riparian forest clearing, which can affect instream habitat and contribute to bank instability (Bull and Scott 1974; Nelson 1993; Kondolf 1997). Bed degradation from instream mining lowers the elevation of stream flow and the floodplain water table (alluvial aquifer; Kondolf 1997), which in turn can eliminate water table-dependent woody vegetation in riparian areas (Kondolf 1998) and decrease wetted periods in riparian wetlands. Entry to mine sites by mining equipment may result in disturbance from repeated crossing of the stream channel and from road building through riparian areas.

Floodplain

Floodplains and terraces (former floodplains) are the sites of sediment storage in stream systems, and can contain large quantities of sand and gravel that can be mined economically. Floodplain mining pits often extend below the water table, which can provide a convenient water source for separating desired particle sizes from excavated materials. A floodplain mine also can become the nucleus of major instability in the adjacent stream channel when lateral channel movement or overbank flows redirect the active channel through the excavation pit.
When floodplain pits "capture" the active channel, off-channel mines become instream mines that then produce the negative symptoms associated with instream excavation (Kondolf 1997).

Channel capture often happens abruptly and usually occurs where the excavation pit offers flood flows a path of less resistance, often where the path is a shorter distance for flow to move down valley. Captured pits that are large relative to the stream channel create lake-like environments that can locally change environmental conditions and therefore the biological community, in some cases enhancing populations of problematic non-native species (WCC 1980a; Kondolf 1998). Similar effects can occur when mining directly connects floodplain pits to the active channel (WCC 1980a).

Several examples of channel capture by excavation pits have been documented. A gravel pit located in an inactive floodplain channel of Tujunga Creek, California, captured the active channel during a flood and initiated two headcuts that moved 2,600 and 3,000 feet upstream with vertical incision up to 14 feet (Bull and Scott 1974; Collins and Dunne 1990); the pit trapped sediment arriving from upstream, and the hungry water exiting the pit continued the bed degradation downstream. Two gravel mine pits in the floodplain of the Yakima River, Washington, captured the active channel during a flood, relocating the channel laterally nearly 2000 feet within a day (Dunne and Leopold 1978). An off-channel pit captured the active channel of the Clackamas River, Oregon, causing 6 feet of channel incision over 3000 feet upstream (Kondolf 1997). Eight gravel mining pits, originally in floodplain locations, are now in-channel pits following capture by the Merced River, California (Vick 1995).

CHERT

As was cited: US EPA Draft Mad River Total Maximum Daily Loads for Sediment and Turbidity, October 2007; Re: Gravel Mining, pg 8:

✓

"Gravel mining developed concurrently with the logging industry, supplying the materials for road building. Gravel mining has been a significant industry in the area between the Mad River Hatchery near Blue Lake and the Highway 101 bridge near the mouth since at least 1952. In 1992, a memorandum of agreement (MOA) was signed for gravel mining regulation, and a programmatic environmental impact report (PEIR) was completed in 1994. In 1992, a scientific advisory committee, known as the County of Humboldt Extraction Review Team (CHERT) was appointed by the Humboldt County Board of Supervisors to provide scientific oversight of gravel extraction and to establish an adaptive management program to obtain some dynamic equilibrium and channel stability (Lehre et al. 2005). CHERT reviews gravel extraction information and makes recommendations on gravel mining, which is concentrated within a 7.5mile reach from about 5 to 12.5 miles from the mouth of the river, ending near the Mad River Fish Hatchery (Lehre et al. 2005). Most of the gravel mining occurs in the upper portion, which is braided and bounded by a broad floodplain. The lower portion is confined within a bedrock gorge, then broadens to a wider floodplain (Lehre et al. 2005)"……

"Lehre et al. (2005) provide detailed information for the geomorphology and response of this reach of the river to gravel mining in order to determine a sustainable rate of extraction. In summary, Lehre et al. (2005) acknowledged some uncertainty in several recent studies in the area, concluding that the current extraction rates may be either the maximum sustainable rates or greater than the maximum sustainable rates. Their estimates of sustainable rates were greater than Knuuti and McComas (2003), but smaller than Kondolf and Lutrick (2001, in Lehre et al. [2005])"……

"The California Department of Transportation (CalTrans) has surveyed channel cross sections at the Highway 101 and Highway 299 bridges since 1928, showing significant bed degradation, although one of the gravel operators also conducted a survey and came to a different conclusion (Knuuti and McComas 2003; Pacific Affiliates 1999, in Knuuti and McComas 2003)"……

If you are not a where, Lehre (2005) is also referred as the: Draft 2005 COUNTY OF HUMBOLDT EXTRACTION REVIEW TEAM (CHERT) HISTORICAL ANALYSES OF THE MAD RIVER: 1993-2003,

As of 2007, Lehre (2005) has now been referenced by the North Coast Regional Water Quality Control Board (RWQCB), and the United States Environmental Protection Agency (US EPA). In reference to questions regarding proposed Total Maximum Daily Loads (TMDLs) for sediment and turbidity for the Mad River watershed and tributaries (US EPA) and justification for Clean Water Act 401 waste discharge requirements and permit (RWQCB).

This is where the US EPA, RWQCB and many other state and federal regulatory agencies have let themselves be bamboozled by the authority of CHERT. CHERT's role and responsibility has only been in place, to safeguard the mining operators' and their livelihood.

CHERT has absolutely no authority too or enforce any county, state or federal regulation, law, act or code. The Humboldt County Board of Supervisors and Mining Operators has given CHERT its role and responsibilities that are traditionally given to an enforcement/regulatory agency, and that does not comply with the California State Administrative Procedures Act. With no exception, all state and federal instream surface mining regulatory and enforcement agencies, hampered by inadequate funding and low staffing levels, have allowed CHERT it's so called *scientific advisory authority* over instream surface mining in Humboldt County.

The following are members of CHERT, and report responsibilities for Lehre (2005)

<u>Doug Jager</u>: assembled the cross-section data, put it in a common format, checked it for consistency and correctness, and corrected it where necessary.

<u>Randy Klein</u>: did the data collection and analysis of active channel width and bank erosion, wrote the introduction and sections on active channel width and bank erosion, and edited and assembled the report. He prepared figures 1, 2, 5, and 6, and tables 2 and 3.

<u>Andre Lehre</u>: did the analysis of the cross-section changes and wrote most of the text. He prepared all figures other than 1, 2, 5, and 6, and all tables other than 2 and 3.

<u>Bill Trush</u>: did the biological and fish habitat analysis. It is still in preparation and not included in this draft.

All of which, are paid directly and individually by the Mad River mining operators for their time spend on this analyses (Lehre 2005).

As stated in Lehre (2005): *"Gravel mining companies have collected a substantial amount of monitoring information, primarily channel cross sections and air photos. The accumulated data set provided a good basis for evaluating how the river has responded to the adaptive management program and re-evaluating sustainable mining volumes and methods"….*

Whose best interest does this serve? The operators are monitoring and documenting themselves? And everyone thought CHERT was monitoring Instream gravel extraction in Humboldt County!

Lehre (2005) points out: *"Thus there are now three 'competing' sediment budgets that address sustainable mining volumes on the Mad River which differ in how 'available gravel' is defined and in the approaches taken to determine channel changes, gravel recruitment, and sustainable mining volume" ….*

I thought: Lehre (1993), Kondolf and Lutrick (2000), Knuuti and McComas (2003) were studies, not bids. The only ones "*competing"* for higher sediment budgets are the mining operators.

Lehre (2005) also points out: *"Although the sustained yield estimates from these studies are considered fairly close from a scientific perspective given the various methods used and assumptions made, the differences are considered economically significant by mine operators"….*

"Economically significant?" you mean: Low sediment extraction budgets = Financial degradation for sand & gravel mining operators. "*Fairly close?"* you are talking about a difference of 158,000 yd/year between *Kondolf and Lutrick (2001)* and *Knuuti and McComas (2003).* I would call that environmentally significant!

Conclusion of Lehre (2005): *"This analysis suggests that, under current conditions, overall "zero effect" extraction on the Mad River is on the order of 85,000 yd/year for the upstream reach and 50,000 – 70,000 yd/year for the downstream reach, or a total of 135,000 – 155,000 yd/year for the entire river. Given the uncertainties in this approach, the current average extraction of 175,000 yd/year is not unreasonable, but certainly appears to be an upper limit. The 270,000 yd3/year that Kondolf and Lutrick (2001) suggest might be extracted appears much too high, while the 112,000 yd3/year suggested by Knuuti and McComas (2003) is probably unnecessarily low"….*

CHERT must be using SWAG (Scientific Wild Ass Guess). Scientifically speaking, CHERT would split the difference of extraction amounts per year, between the high (Kondolf and Lutrick (2000) and the low (Knuuti and McComas (2003), add 17,000 yd/year to the mix and keep their clients (Mad River mining operators) economically green.

Of the studies cited in Lehre (2005): Lehre (1993), Kondolf and Lutrick (2000), Knuuti and McComas (2003). Only Knuuti and McComas (2003) was not commissioned by any Mad River mining operator (lowest of annual extraction yd/year), but by the US Army Corps.

CHERT: Who, What, Why, When and Where

a) CHERT is comprised of 4 individual contractors, who are appointed and serving at the pleasure of the Humboldt County Board of Supervisors, not the public.
b) CHERT is not a county or state agency.
c) CHERT is not a Company, Firm or Business.
d) CHERT does not notify the public or accept public comments on its final decisions concerning instream mining extraction amounts or proscriptions'.
e) CHERT members are paid directly and individually by each mining operator for direct services rendered.
f) CHERT members are paid directly, individually and equally between the mining operators for fixed in-direct service rendered.
g) All CHERT program expenses are shared and paid equally between the mining operators, directly and individually to each CHERT member.
h) Quarterly billing from CHERT, state Mining Operators by name as "client"
i) CHERT represents and serves as an agent, in the best interest of the gravel mining operators, not the public for instream surface mining in Humboldt County.
j) The Public is not allowed to attend annual meetings with CHERT and regulatory agencies (Gravel Week) discussing site visits, inspections, or post extraction reports.
k) The public is not allowed to contact CHERT members, without first talking to Kirk Girard, Humboldt County Planning Director.

CHERT members have not always been paid directly and individually by the Mining operators. When the Lower Eel River PEIR was adopted by the Humboldt County Board of Supervisors, on July 2, 1996. CHERT was paid thru what was called the "Surface Mining & Reclamation Program Citizens' Advisory Committee" (SMAC). This way CHERT would have no conflict of interest; there would be a checked and balanced oversight and public participation, in-part make up by members of the public, mining operators and their agents. Costs incurred by the activities of the CHERT, associated with all instream surface mining in Humboldt County (including Mad River), shall be payable by the mining operators and reviewed by CHERT and SMAC as part of their annual activity. The CHERT shall keep records of the time spent on individual operating sites and shall keep a record of their time spent on each extraction site and on activities involving the entire project area or multiple operations. The CHERT shall submit billing statements as necessary to the secretary of the SMAC, who will administer billing of operators and payments to CHERT through a checking account at a local bank. The account will be called the "CHERT Monitoring Account". Checks to CHERT will be signed by the secretary and counter signed by persons authorized by SMAC.

SMAC stopped meeting sometime in late 1999 or early 2000. Nobody knows for sure, even after talking with CHERT members and ex-SMAC committee members. I was told by the Humboldt County Planning Director (Kirk Girard) on Sept.16, 2005:

"The Surface Mining & Reclamation Program Citizen's Advisory Committee (aka "SMAC") stopped meeting about five or six years ago. The Committee was never formally abolished by the Board but is essentially defunct. The majority of Committee members represented the mining industry"……
"The most common topic was overly burdensome regulations. SMAC was basically replaced by a Surface Mining & Reclamation Program sub-committee of the Board of Supervisors. Supervisor's Neely and Rodoni are the current members of the sub-committee".

"I can't recommend re-starting SMAC because of the negative history of that particular Committee and because I don't see the need for a citizen's committee to advise the Board of Supervisors on gravel extraction issues at the moment. The Board has not directed any changes to the existing regulatory program and there are no major policy issues confronting the Board on the immediate horizon"…….

The only thing we do know for sure about SMAC: its role for instream gravel extraction and CHERT was dissolved in a regular session of the Humboldt County Board of Supervisors on TUESDAY, MARCH 26, 2002, item 7 of the meeting agenda.

In dissolving SMAC, there is *NO* public forum to address issues and concerns by the public, in regards' to instream gravel extraction in Humboldt County. It's a done deal. For the public to be involved with instream gravel extraction issues in Humboldt County is impossible, or NEVER! If the public does ask questions to state and federal agencies (as I know first hand), "let the finger pointing begin". Everybody wants the money for permits and being the "lead agency" but no one wants the responsibility and accountability for the mining operators' actions.

Summary

- ✓ Instream gravel mining can disrupt the preexisting balance between sediment supply and transporting capacity and can result in channel incision and bed degradation!
- ✓ Instream gravel extraction can increase suspended sediment, sediment transport, water turbidity, and gravel siltation!
- ✓ Bed degradation can change the morphology of the channel and decreases channel stability!
- ✓ Gravel bar skimming can significantly impact aquatic habitat!
- ✓ Operation of heavy equipment in the channel bed can directly destroy spawning habitat, rearing habitat, the juveniles themselves, and macroinvertebrates; can produce increased turbidity and suspended sediment downstream; and has the potential to cause toxic chemical spills!

- ✓ Stockpiles of overburden and gravel left or abandoned in the channel or floodplain can alter channel hydraulics during high flows!
- ✓ Removal or disturbance of instream roughness elements during gravel extraction activities can negatively affect both quality and quantity of anadromous fish habitat!
- ✓ Dry pit and wet pit mining in floodplains may reduce groundwater elevations, reduce stream flows, increase water temperature, and create potential for fish entrapment!
- ✓ Destruction of the riparian zone during gravel extraction operations can have multiple deleterious effects on anadromous fish habitat!
- ✓ Gravel mining can cause a change in disturbance regimes and patterns with a concomitant change in habitat and species!
- ✓ CHERT is not the authority for instream gravel mining in Humboldt County!
- ✓ CHERT is not an agent for Humboldt County or the public!
- ✓ CHERT must be a third party for the PEIR.
- ✓ CHERT and its members, must serve in the best interest of the Mad River PEIR!
- ✓ CHERT should not be paid for services rendered by the mining operators!
- ✓ SMAC should be reinstated to oversee CHERT and the PEIR!
- ✓ CHERT Post Extraction Reports need to be prepared every year!!!!
- ✓ CHERT should be hear and seen by the public.

It was this comment, from a CHERT Post Extraction Report, which sums up reality. How all involved except, justify and mitigate their actions as instream mining operators: *"Except in rare cases, gravel mining harms rivers, but we allow it to continue because of society's need for aggregate, attempting to balance the need for aggregate with other competing interests"……*

Similarly, surrounding the Wounded Knee Massacre of Dec. 29, 1890. L. Frank Baum (author: "Wizard of Oz") wrote in the *Aberdeen Saturday Pioneer*, Jan. 3, 1891: *"The Pioneer has before declared that our only safety depends upon the total extermination of the Indians. Having wronged them for centuries, we had better, in order to protect our civilization, follow it up by one more wrong and wipe these untamed and untamable creatures from the face of the earth"……..*

We must demand that our seventh generation have the same range of possibilities for their Watershed as we have for ours. Too many times, we don't question the negative, often malicious consequences of our greed. While progress should never come to a halt, there are many places it should never come to at all.

Thank you for your time and consideration in this matter,

Ed Voice & Voice Family
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- OWRRI 1995 ***"Over the last six million years, salmonids have evolved within the natural disturbance regime. Novel disturbances can shift the ecological rules governing community structure making the recovery of the original biota impossible"……***

Friends of Small Places
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November 16, 2007

Michael Wheeler, Senior Planner
Humboldt County Community Development Services
3015 H Street
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Re: Public Comment for the Notice of Preparation of a Draft Supplemental to the Program Environmental Impact Report on Gravel Removal from the Lower Mad River, Humboldt County, California

Dear Mr. Wheeler,

I am submitting these comments on the behalf of Friends of Small Places and the Environmental Protection Information Center (EPIC). Friends of Small Places is an organization concerned with the impacts to small rural neighborhoods and river ecosystems of in-stream gravel mining, including the industrial processing of river aggregate, such as crushing and concrete and asphalt production. EPIC is a community based non-profit organization that actively works to protect and restore ancient forests, watersheds, coastal estuaries, and native species in northwest California.

Friends of Small Places was formed as a direct result of the unsatisfactory behavior of several different aggregate operators located on Humboldt County rivers, including the Mad, Van Duzen, Eel, and Trinity; as well as what we believe to be insufficient oversight by county and resource agency officials.

Friends of Small Places and EPIC believe it is important to have full public involvement in any project, such as in-stream gravel extraction, that impacts Public Trust lands.
We would like to suggest one way to assure full involvement of the public would be to re-convene the Surface Mining Citizen's Advisory Committee (SMAC). It is our understanding that for the past several years this has instead been a sub-committee of the

Board. We believe a well-balanced appointment of interested individuals to SMAC would be a positive way of discussing and problem-solving concerns and issues of all stake-holders.

In addition, we would like to see the following requirements consistently adhered to from page 6 of the Interim Monitoring Program and Adaptive Management Practices for Gravel Removal from the Lower Eel and Van Duzen Rivers Adopted July 2, 1996 by the Humboldt County Board of Supervisors:

I. Following each extraction season, the CHERT shall prepare a post-extraction report which shall be made public. This report shall include post-extraction inspection data and may incorporate data and information obtained in the County's SMARA annual inspection and reclamation plan review, and any other relevant data or comments discovered or submitted to the CHERT.

J. All prescription reports and post-extraction reports shall be public documents, available at the Humboldt County Library in Eureka by February 15th of each year. At the end of each extraction season, following preparation and release of a post-extraction report, interested parties shall be informed by letter if they have so requested in writing, and by Notice published in local newspapers. A public comment period of thirty (30) days shall occur. Comments shall be directed to the County Public Works Department. The CHERT will review the comments received and may develop responses to present at a public meeting held by the County.

The following are a summary of comments that FOSP submitted in September 2006 on the CHERT Post-extraction Reports that we would like to see addressed in the Draft Supplemental PEIR:

After reviewing the most recent CHERT reports, we find a striking difference in the lack of depth and breadth of content from previous CHERT Post-Extraction Discussion Drafts. The lack of information in the report makes it nearly impossible for the public to provide any substantive comment on the status of in-stream gravel extraction and the functionality of the CHERT process in Humboldt County.

The reports are merely a list of pre- and post extraction amounts in cubic yards and disturbed acres, with a few terse comments. There is no way to verify the accuracy of the extracted amounts, or to tell if any other errors exist, either deliberate or accidental. A signed and stamped verification by the licensed surveyor who did the work should be included, either in the body of the report as an appendix, or otherwise referenced.

Also unsatisfactory are the statements, “Additional details on CHERT’s role have been presented in earlier post-extraction reports and will not be repeated here”, and “The concepts of sustained yield gravel extraction and mean annual recruitment have been described in earlier CHERT post-extraction reports and will not be repeated here.” In order for the County to meet their responsibility of public participation, it is important to include complete information in the Discussion Drafts, even if it means repeating previously presented information. Excluding this type of information results in excluding the public at large, who are not agency officials, resource professionals, environmental consultants, or mining industry members; and who may not be familiar with prior CHERT post-extraction reports.

Accepting and responding to public comment on the Post-Extraction Discussion Draft is an important opportunity for public participation. There have been significant problems with this process that has seriously impeded the public's right to participation. The Post-Extraction Discussion Draft should always be released on time each year, which has not always been the case. The 60-day public comment period should remain consistent. The release of the Post-Extraction Discussion Drafts should be noticed in a local newspaper such as the *North Coast Journal or Times-Standard*, the usual paper of record for the Humboldt County Community Development Services. And, the Humboldt County Community Development Services should develop a direct notification list for future Post-Extraction Discussion Drafts.

In addition, Friends and EPIC would like to stress that the primary objective of Adaptive Management should be to improve and enhance the Mad River watershed as opposed to simply attempting to mitigate the well-documented negative impact of in stream gravel extraction and the connected actions of extensive industrial post-processing. Currently, we believe that the Adaptive Management process is being implemented more for the benefit of the aggregate operators and not the riverine ecosystem or the public.

Both Friends and EPIC thank you for the opportunity to submit these comments and would like to be included in all upcoming public participation for this project.

Sincerely,

/s/

Kristen Lark
Environmental Projects Director
Friends of Small Places

From: Diana Henrioulle-Henry [DHenrioulle-Henry@waterboards.ca.gov]
Sent: Wednesday, November 21, 2007 12:18
To: Wheeler, Michael
Cc: David Leland; Samantha Olson
Subject: NOP of draft SEIR for gravel removal from the Lower Mad River

Mr. Wheeler

We received Humboldt County's Notice of Preparation of a Draft Supplemental to the PEIR for gravel removal from the Lower Mad River on October 22, 2007. Based on our review of the NOP, we suggest that the SEIR include the following:

-the NOP indicates that the review will consider, in part, the CHERT analysis and review of extraction on the Mad River for the years 1993 to 2003. We recommend that Humboldt County incorporate into the review data obtained for the subsequent four years, as well, 2004-2007.

-We recommend that Humboldt County include in this effort an independent third party peer review of the effectiveness of the CHERT program in meeting the County's goals, per the 1994 PEIR "to assure that changes in dynamic equilibrium and channel stability resulting from gravel mining are minimized" and "to safeguard fishery habitat and reduce any adverse aggregate mining-related cumulative or future impacts to a level of insignificance."

-Please note that the Regional Water Quality Control Board is also involved in permitting and regulating instream mining activities in Humboldt County, and intends to rely on the County's CEQA documentation.

We look forward to reviewing the SEIR. If you have any questions, please contact me by email or at (707)576-2350.

Sincerely, Diana Henrioulle

From: Scott Bauer [SBAUER@dfg.ca.gov]
Sent: Monday, November 26, 2007 16:24
To: Wheeler, Michael
Cc: Gordon Leppig; Michael van Hattem; William Condon
Subject: Notice of Preparation of Draft Supplemental to PEIR forMadRiver Gravel Extraction

Good afternoon Michael,

The following comments are derived from a review of the 1994 PEIR and the 2007 Notice of Preparation for a Supplemental Environmental Impact Report (SEIR). These are informal comments, as formal DFG comments or recommendations on this project would come in the form of a letter from our regional manager.

Based on the supporting reports found in the appendices of the 1994 Programmatic Environmental Impact Report (PEIR), the establishment and retention of riparian vegetation is closely correlated with hydrologic processes (Theiss 1993). Furthermore, the alteration of natural hydrological processes by gravel extraction can affect riparian vegetation by accelerating the rate of erosion and/or precluding the deposition of materials (and subsequent establishment of riparian vegetation) over time (Theiss 1993).

Vegetation

1. The SEIR proposes to address potential environmental effects related to the Adaptive Management Program including, “2) instream aggregate extraction effects on riparian habitat quality, and whether extraction activities could lead to impacts on acreage and maturation of riparian habitat.” We consider gravel extraction activities to directly and indirectly reduce the amount of riparian habitat and its development over time. In addition, most if not all aggregate processing facilities on the Lower Mad River are situated in riparian areas, and directly affecting riparian habitat. The SEIR should include a discussion of potential mitigation measures and sites to increase riparian habitat acreage, and how buffers can be incorporated into existing gravel operations (including gravel stockpiles) to protect and restore riparian areas.

2. Veg-1: Mitigation: Mit-1 states that “The SDRC will look for opportunities to mitigate for past losses in riparian habitat.” Furthermore, “These safeguards will help reduce past cumulative effects and assure that future gravel extraction induced disturbances to riparian vegetation will be less that significant.” For the SEIR,

please explain what “opportunities to mitigate for past losses in riparian habitat” have been implemented, including area estimates, and the success or failure of those revegetation activities.

3. Veg-2: Mit-3 states that the SDRC will monitor river banks to initiate bank stabilization revegetation practices. In the SEIR, please explain what bank stabilization activities conducted by the SDRC have occurred since adoption of the 1994 EIR.

4. Veg-2: Mit-9: States that abandoned stockpiles sites will be replanted. In the SEIR, please explain if any abandoned stockpiles have been replanted, and where those locations are.

Wildlife

1. Wild-1: states that the preferred alternative will not increase the loss of wildlife habitat. In the SEIR, please explain quantitatively, in terms of area, habitat composition, and structure, if the preferred alternative in fact did not decrease wildlife habitat since its adoption in 1994:

a. Specifically, Table 4.3-1 states that 189.3 acres of scrub vegetation and 331.1 acres of riparian vegetation occur on the 10 extraction parcels based on 1993 aerial photographs. In the SEIR, determine and explain what changes over time has occurred to scrub vegetation and riparian vegetation, and whether those changes are attributed to surface mining.

b. The SEIR should also include a discussion of what methodologies were used for vegetation monitoring, as well as a discussion of continuing and future monitoring methodologies.

2. As stated in the 1994 EIR, pre-extraction surveys occurred annually and monitoring was conducted for at least 5 years. Based on surveys/monitoring:

a. Discuss the distribution of northern red legged frogs (Rana aurora), northwestern pond turtles (Clemmys marmorata marmorata), and foothill yellow-legged frogs (Rana boylii) within the 10 extraction parcels. Within the discussion, explain whether these species were identified using: 1) natural habitat, 2) extraction related ponds, and 3) whether those locations were disturbed/degraded within the given year or in subsequent years.

b. Similar to above, discuss the distribution of bullfrogs (Rana catesbeiana) within the 10 extraction parcels.

c. Bullfrogs are an invasive non-native species and are a known predator of the aforementioned amphibian and reptile DFG Species of Special Concern. If bullfrogs have been identified during annual surveys and monitoring, explain their distribution, and discuss in the

SEIR how this species might be eradicated in order to protect native species. In particular focus on extraction related ponds (i.e., lentic habitat).

3. The willow flycatcher (Empidonax traillii) was listed as endangered and afforded formal protection under the California Endangered Species Act (CESA) in 1991. Since its listing, surveys have increased within Humboldt County and the willow flycatcher has been assigned possible and probable breeding status in the lower portions of the Eel and Klamath Rivers (Hunter et al. 2005). Willow flycatcher surveys within the 10 extraction parcels were reported to begin in May 1993 in an attempt to identify territorial behavior or evidence of nesting. The SEIR should discuss: 1) the results of all surveys conducted for the willow flycatcher within the 10 extraction parcels, 2) habitat suitability for the willow flycatcher within the 10 extraction parcels, and 3) what activities have been implemented within the 10 extraction parcels that will aid in recovery, and ultimately delisting, of the willow flycatcher in California. Significant impacts that may result in take of the willow flycatcher will require an Incidental Take Permit pursuant to Fish & Game Code Section 2081(b).

Fish

1. The Notice of Preparation states that the supplemental review will consider, "…2) the regulatory status of salmonids and their habitat within the project areas; and 3) the NOAA-Fisheries 2003 biological opinion." The SEIR needs to include a thorough discussion of state-listed (CESA) Coho salmon and any potentially significant impacts gravel operations will have upon this species. Significant impacts that may result in take of Coho salmon will require an Incidental Take Permit pursuant to Fish & Game Code Section 2081(b).

2. Fish-6: Mit-1: States that information gathered during aquatic habitat monitoring (presence and significance of large woody debris) will be used to develop site-specific extraction prescriptions that will minimize adverse impacts and, where possible, enhance these river resource conditions. In the SEIR, please explain where instream habitat has been enhanced and whether the enhancements included large woody debris components.

Reclamation Plans

1. A number of Reclamation Plans for gravel extraction sites on the Mad River are currently awaiting approval from the County of Humboldt for 15-year extensions. Section 6.13 of the PEIR states that Reclamation Plans need to be revised "to conform with the mitigation measures and reclamation standards provided herein." Considering the

SEIR will most likely incorporate new mitigations and reclamation standards, we believe the County of Humboldt should not approve any Reclamation Plan extensions until the SEIR has been reviewed and approved.

Literature Cited

Hunter, J.E., D. Fix, G.A. Schmidt, and J.C. Power. 2005. Atlas of the Breeding Birds of Humboldt County, California. Redwood Region Audubon Society. Reischling Press, Inc., Seattle, Washington. 440p.

Theiss, K. 1993. Draft Botanical Resources Study for Program EIR Mad River, Mad River Gravel Extraction. Karen Theiss and Associates Biological and Environmental Consultants. 16p.

If you have any questions, do not hesitate to give me a call. Thank you for your time.

Sincerely,

Scott Bauer
Environmental Scientist
Coastal Conservation Planning
Department of Fish and Game
Northern Region
619 Second Street
Eureka, CA 95501

Telephone: (707) 441-2011
Fax: (707) 441-2021

Table A-1. Responses to California Department of Fish and Game's comments on this Supplemental PEIR's Notice of Preparation.

CFDG Notice of Preparation comment	Response to comment
In the SEIR, please explain what bank stabilization activities conducted by the SDRC [CHERT] have occurred since adoption of the 1994 EIR.	In the operations' Biological Opinions, measures for protecting riparian vegetation include avoidance, minimum buffer widths, and mitigating for any direct losses (Section 3.1.6). CHERT monitored river banks by reviewing cross section surveys, but has not prescribed bank stabilization by revegetation. CHERT established that bank erosion is primarily a function of peak discharge (Section 5.4.3). Rip rap bank protection has been installed adjacent to Blue Lake Bar, adjacent to Blue Lake sewage treatment plant and adjacent to Hatchery Road.
The SEIR needs to include a thorough discussion of state-listed (CESA) coho salmon and any potentially significant impacts gravel operations will have upon this species. In the SEIR, please explain where instream habitat has been enhanced and whether the enhancements included large woody debris components.	Information on the Southern Oregon, North Coastal California coho ESU, as it relates to gravel extraction on the lower Mad River, is provided in Section 5.2.4.1. A trend analysis of juvenile 1+ coho rearing habitat indicated that, since the CHERT program began in 1992, habitat area has increased compared to that of the 1960s the 1980s (Section 5.2.4.4. and Figure 5-1). Instream habitat for salmonids has been enhanced through increases in juvenile rearing and adult holding habitat (Section 5.2.4.4. and Figure 5-3). If large woody debris enters an extraction site, CHERT recommendations and the LOP requirements ensure that it is retained onsite (Section 3.1.6). However, the public often tries to harvest large wood for firewood. Operators have attempted to limit public access through controlling roads and posting signs (Section 5.4.6). Granite Construction had installed LWD and boulders in the channel at the mouth of the North Fork (Emmerson Bar) and adjacent to Blue Lake Bar.
In the SEIR, please explain quantitatively, in terms of area, habitat composition, and structure, if the preferred alternative in fact did not decrease wildlife habitat since its adoption in 1994. Discuss the distribution of bullfrogs (Rana catesbeiana) within the 10 extraction parcels. If bullfrogs have been identified during annual surveys and monitoring, explain their distribution, and discuss in the SEIR how this species might be eradicated in order to protect native species. In particular focus on extraction related ponds (i.e., lentic habitat).	From 1994 to 2007, riparian habitat area experienced no net gain or loss, from the Highway 101 bridge to the Blue Lake Hatchery (Section 5.2.1.2). Aquatic habitat, as measured by alcove and gravel pit wetland areas, was highly variable; excavated wetland pits are assumed to provide amphibian, bird, and mammal habitat however, species surveys and counts have not been performed. Bullfrog colonization of wetland pits has been observed at Emmerson Bar (Bauer, S., pers. comm.. 2008). The CDFG will be considering implications of bullfrog colonization in reviewing future wetland pits, but no effective eradication methods are presently known.

CFDG Notice of Preparation comment	Response to comment
The SEIR should discuss: 1) the results of all surveys conducted for the willow flycatcher within the 10 extraction parcels, 2) habitat suitability for the willow flycatcher within the 10 extraction parcels, and 3) what activities have been implemented within the 10 extraction parcels that will aid in recovery, and ultimately delisting, of the willow flycatcher in California.	Willow flycatcher sightings have been documented in the vicinity of the Mad River (Section 5.2.3.6) but no surveys specifically for the willow flycatcher have been performed at the extraction sites.
Discuss the distribution of northern red legged frogs (Rana aurora), within the 10 extraction Parcels.	Northern red legged frogs are widespread on the California North Coast, and breeding frogs are documented in the vicinity of the lower Mad River (Section 5.2.3.1). They are assumed to be present in both natural and created (by mining) ponds and alcoves.
Discuss the distribution of foothill yellow-legged frogs (Rana boylii) within the 10 extraction Parcels.	Foothill yellow-legged frogs may be present at the extraction sites, but they are not likely to be as numerous as the Northern red legged frogs. No surveys for yellow-legged frogs have documented their distribution at the extraction sites.
Discuss the distribution of northwestern pond turtles (Clemmys marmorata marmorata) within the 10 extraction parcels.	Northwestern pond turtles have been documented "downstream at least to the Blue Lake bridge area" (MRB 1993), but no other surveys have documented them at the extraction sites.
The SEIR should include a discussion of potential mitigation measures and sites to increase riparian habitat acreage, and how buffers can be incorporated into existing gravel operations (including gravel stockpiles) to protect and restore riparian areas. For the SEIR, please explain what "opportunities to mitigate for past losses in riparian habitat" have been implemented, including area estimates, and the success or failure of those revegetation activities.	In the extraction operations' Biological Opinions, measures for protecting riparian vegetation include avoidance, minimum buffer widths, and mitigating for any direct losses (Section 3.1.6). Pre-extraction plans propose extraction activities and any mitigation measures. CHERT recommends that the activities and measures proceed as planned, or that changes be made. Trends in riparian habitat area have been analyzed from the Highway 101 bridge to the Blue Lake Hatchery, and from 1994 to 2007, no net gain or loss has occurred (Section 5.2.1.2). Historical (pre-1992) losses due to natural processes (e.g., floods) were documented and cannot be mitigated by the Proposed Project.
Specifically, Table 4.3-1 states that 189.3 acres of scrub vegetation and 331.1 acres of riparian vegetation occur on the 10 extraction parcels based on 1993 aerial photographs. In the SEIR, determine and explain what changes over time has occurred to scrub vegetation and riparian vegetation, and whether those changes are attributed to surface mining.	Riparian vegetation was classified differently in the Trush (2008) study, based primarily on channelbed types; riparian vegetation was noted but not used as the single criterion to define classification. Individual extraction sites were not surveyed; instead the Lower Mad River from the Highway 101 bridge to the Blue Lake Hatchery was analyzed. Riparian habitat area from the Highway 101 bridge to the Blue Lake Hatchery, from 1994 to 2007, did not increase or decrease (Section 5.2.1.2). Consequently, no broad effects from mining can be detected, and localized effects are avoided by implementing the Corps' LOP.

CFDG Notice of Preparation comment	Response to comment
Include a discussion of what methodologies were used for vegetation monitoring, as well as a discussion of continuing and future monitoring methodologies.	The methodologies of the NRM (2000) and Trush (2008) studies are similar (Section 5.2.1.2). Aerial photographs over time were obtained. The photos were viewed, and areas of varying vegetation communities were delineated, estimated, and summed. Observation in the field verified that vegetation was correctly identified from the aerial photos. Thus, areal changes in various vegetation communities over time were documented.
In the SEIR, please explain if any abandoned stockpiles have been replanted, and where those locations are.	Granite has one abandoned stockpile on the south side of the river adjacent to Johnson Bar. Guynup has one on the north side of the river. Both were created during a late short extraction season (year uncertain) when bridges could not be installed to transport the extracted gravel to processing areas.

From: leslie wolff [Leslie.Wolff@noaa.gov]
Sent: Tuesday, November 20, 2007 15:58
To: Wheeler, Michael
Cc: Dan Free
Subject: Re: Mad River NOP

Michael,
Thank you for the opportunity to comment on the Mad River Supplemental EIR Notice of Preparation. The following are NMFS' comments:

1. We recommend that physical and biological data continue to be collected annually as part of the Adaptive Management Program for gravel mining on the Mad River. Although data has been collected and the Adaptive Management Program will be assessed in the Supplemental EIR, the need for an adaptive management program continues, with continued need for data and periodic analyses.

2. NMFS' most recent biological opinions for gravel mining on the Mad River were both issued in 2004. These biological opinions are the batched consultation for the individual permits for Eureka Ready-Mix, Granite Construction and the Guynup site, as well as the biological opinion for LOP-2004 which includes the Miller/Almquist site and the Essex Bar mined by Mercer Fraser. If you do not have copies of both of these biological opinions, please let me know and I will email them to you.

3. We recommend that the Corps' analysis of gravel recruitment in the lower Mad River also be used as part of the best available information when assessing the effectiveness of the Adaptive Management Program and the concept of mean annual recruitment. The Corps' report was prepared by Knuuti and we can provide you with a copy if requested.

4. Is the 2006 CHERT report available for distribution?

5. How will potential additional mining sites and/or mining applicants that propose to increase the annual amount of gravel mining on the Mad River be considered in the Supplemental EIR?

Wheeler, Michael wrote:
> Attached is the Mad River Supplemental EIR Notice of Preparation per your request. The comment period closes 30 post receipt of the NOP by agencies, which in the case of NOAA Fisheries would be November 23 as noted on our registered mail return receipt. If you need more time than that, please let me know and indicate a firm date by which you would provide

comments. Since this is just a scoping of issues to be addressed, it should not take too much time to respond. We look forward to your comments. Thanks.

>
> <<Final NOP 10-02-07.doc>>
>
> Michael E. Wheeler
> Senior Planner - County of Humboldt
> Department of Community Development Services
> 3015 H Street, Eureka, CA 95501
> v. 707-268-3730 fax 707-445-7446
> email: mwheeler@co.humboldt.ca.us
>

CITY OF BLUE LAKE

Post Office Box 458, 111 Greenwood Road, Blue Lake, CA 95525
Phone 707.668.5655 Fax 707.668.5916

February 23, 2009

RECEIVED
FEB 2 7 2009
HUMBOLDT COUNTY
PLANNING DIVISION

Michael E. Wheeler, Senior Planner
County of Humboldt
Department of Community Development Services
Planning Division

Gravel Removal from the Lower Mad River

Dear Mr. Wheeler,

The City of Blue Lake is a community that is directly adjacent to and thus intimately connected with the Mad River. As the Blue Lake City Council, we must express our concern regarding the proposed gravel extraction.

We have many concerns of which the most serious is the potential degradation of the river system. If the integrity of our Waste Water Treatment Plant is compromised, there would be an environmental disaster of monumental proportions. We believe that we are one of the stewards of the Mad River system and have worked tirelessly to protect it. For years, the operators of our treatment plant have successfully kept our system from any violations of that trust. We owe that to our environment and all of those who live and recreate downstream from Blue Lake. If a massive removal of gravel is permitted, the geomorphic changes in the river bar system would be unpredictable. No one can predict how future weather events will impact the river. Nor can anyone, without a shadow of a doubt, determine how extensive gravel removal will affect the integrity of the banks of the river that protect our Treatment Plant and thus the river itself.

The City of Blue Lake would be the sole traffic path for removal trucks for all gravel taken from north of the Hatchery Road Bridge and immediately to south of the City itself. This would be an unacceptable impact on our infrastructure. We have no mechanism to collect any funds for the considerable impact these giant trucks would have on the wear of our streets. The truck route passes through the heart of our town and directly past our elementary school. No other route can be determined.

Finally, there is the concern of harm to the habitat of our beautiful river itself. Since the river borders Blue Lake, many of us visit it every day. It is a natural gem to all of Humboldt County and must be preserved at all costs. Past gravel extractions have left serious changes in the river that have destoyed protected areas where fish can feed, reproduce and find refuge from predators and the sun. In recent years, there have been attempts to restore fish habitat by artificially securing large rocks, logs and tree stumps into the river bed. Some have already failed. Why not protect these areas in the first place? Rarely can we undo the effects of man's impact on our earth, and can never predict nature's impact.

These concerns were expressed in the 1994 PEIR on gravel removal of the Lower Mad River. Time has not lessened their impact; quite the opposite.

In Community,

The Blue Lake City Council,

Marlene Smith, Mayor

Karen Barnes, Mayor Pro Tem

Sherman Schapiro, Council Member, Former Mayor

Patricia Falor, Council Member

Michele McCall-Wallace, Council Member

April Walton

58 Esther Lane, Arcata, CA 95521 · (707) 822-7576 · awalton@isp.com

February 27, 2009

Michael E. Wheeler, Senior Planner
County of Humboldt
Department of Community Development Services, Planning Division
3015 H Street
Eureka, CA 95501

Re: Supplemental Environmental Impact Report

Dear Mr. Wheeler:

I have lived in the Blue Lake area for nearly twenty years and in close proximity to the Mad River. The river has provided fishing and other recreational activities to the public as well as providing gravel mining sites for several Humboldt County businesses. The Adaptive Management Program is now concerned with several issues concerning the currently used extraction sites. "Gravel extraction from these sites in the lower Mad River reach has the potential for greater cumulative impacts than *extraction at more isolated mining sites*. (emphasis mine)"

If there is indeed a potential for greater cumulative impacts at the current sites, the extraction amounts at those very sites should be lowered to a more sustainable amount to allow the river bed to recover quickly. This solution is simple and has proven to be effective when used in similar situations, but will not appeal to the gravel companies because of lower extraction amounts. We are in a time when "sustainable" mining practices need to be brought to the forefront, put in place, and adhered to. This does not mean going to new sites for mining when old ones show signs of trouble.

The former Sweasy Dam area should not be considered as an alternative mining site *because* of its location. The removal of gravel and the disruption of sand and silt from this remote area will effect everything downstream from it. This will include the delicate area at the Mad River Hatchery, the weir, and surrounding riverbeds. The old Sweasy Dam area is also a favorite destination for hikers, horseback riders, and biking enthusiasts. It is a quiet and unique place and should remain as such. The business interests of the gravel miners should not take precedence over this section of the river which has remained undisturbed for many years.

Also, assessment and recommendations to river integrity and extraction amounts need to be made by a federal or state instream surface mining regulatory and enforcement agency. I have concerns with any recommendations by CHERT until those **members are not paid for services rendered by the very mining operators who would benefit from their findings and review!**

I urge the Planning Commission to NOT consider opening any isolated gravel extraction sites on the Mad River as a measure to lessen the cumulative impacts at the current sites.

Respectfully Submitted,

APRIL WALTON

DEPARTMENT OF TRANSPORTATION
DISTRICT 1, P. O. BOX 3700
EUREKA, CA 95502-3700
PHONE (707) 441-4693
FAX (707) 441-5869
TTY (707) 445-6463

Flex your power!
Be energy efficient!

March 2, 2009

1-HUM-101/299
Gravel Removal from the Lower Mad River
SCH# 1992083049

Michael Wheeler
Community Development Services
County of Humboldt
3015 H Street
Eureka, CA 95501

Dear Mr. Wheeler,

Thank you for giving us the opportunity to comment on the Draft Supplemental Programmatic EIR for Gravel Extraction on the Lower Mad River prepared by H.T. Harvey and Associates, dated January 9, 2009. 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 mouth of the Mad River (river mile 0) is located at about latitude 40°58'30" North, longitude 124°07'30" West. We have the following comments:

- We have no comment on the preferred administration of the County's SMARA program; however, it does appear that the CHERT program has had a beneficial effect on the overall stability of the Mad River and specifically our structures on Highway 101 and 299.
- Please note that our Mad River Bridges Replacement Project on Highway 101 is currently under construction. Our main concern for this project, and for all of our structures, is the long-term degradation of the river. Gravel mining has been a principle component of the historic problems along the Mad River and needs to be carefully regulated and monitored to protect the health of the river and our structures.

If you have questions or need further assistance, please contact me at the number above or contact Leishara Ward of District 1 Transportation Planning at (707) 441-4693.

Sincerely,

Leishara Ward
Associate Transportation Planner
District 1 Office of Community Planning

RECEIVED
MAR 05 2009
HUMBOLDT COUNTY
PLANNING DIVISION

"Caltrans improves mobility across California"

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

ARNOLD SCHWARZENEGGER
GOVERNOR

CYNTHIA BRYANT
DIRECTOR

RECEIVED

MAR 0 9 2009

HUMBOLDT COUNTY
PLANNING DIVISION

March 3, 2009

Michael E. Wheeler
Humboldt County
3015 H Street
Eureka, CA 95501

Subject: Gravel Removal from the Lower Mad River, Humboldt County
SCH#: 1992083049

Dear Michael E. Wheeler:

The State Clearinghouse submitted the above named Supplemental EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on March 2, 2009, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Terry Roberts
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 1992083049
Project Title Gravel Removal from the Lower Mad River, Humboldt County
Lead Agency Humboldt County

Type SIR Supplemental EIR

Description The original description for the project was "Development of an enforceable in-stream mining regulatory program that will operate under the authority of the California Surface Mining and Reclamation Act (SMARA)..." (Programmatic Environmental Impact Report on Gravel Removal from the Lower Mad River, (PERI) page 4.) The Supplemental project is a required review of the effectiveness of the Adaptive Management Strategy adopted as a part of the enforceable in-stream mining regulatory program.

Lead Agency Contact

Name Michael E. Wheeler
Agency Humboldt County
Phone 707-445-7540 **Fax** (707) 445-7446
email
Address 3015 H Street
City Eureka **State** CA **Zip** 95501

Project Location

County Humboldt
City
Region
Lat / Long
Cross Streets Hwy 101 and hwy 299
Parcel No. Numerous
Township **Range** **Section** **Base** HM

Proximity to:

Highways 101
Airports Arcata/Eureka
Railways Northwestern Pacific
Waterways Mad River
Schools Arcata and Blue Lake Schools
Land Use PLU: Gravel Mining
Z: Various
GP: Various

Project Issues Air Quality; Cumulative Effects; Minerals; Vegetation; Wetland/Riparian; Wildlife

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Reviewing Agencies Resources Agency; Department of Conservation; Department of Fish and Game, Region 1E; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 1; Department of Food and Agriculture; Air Resources Board, Major Industrial Projects; Regional Water Quality Control Board, Region 1; Native American Heritage Commission; Public Utilities Commission; State Lands Commission

---

Date Received 01/15/2009 **Start of Review** 01/15/2009 **End of Review** 03/02/2009

Note: Blanks in data fields result from insufficient information provided by lead agency.

STATE OF CALIFORNIA

Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

January 20, 2009

Clr
3.2.09
e

RECEIVED
FEB 10 2009
STATE CLEARING HOUSE

Michael E. Wheeler
Humboldt County Dept. Of Community Development Services
3015 H Street
Eureka, Ca 95501

RE: SCH#1992083049 Draft Supplemental to the Program Environmental Report on Gravel Removal/Lower Mad River; Humboldt County

Dear Mr. Wheeler:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Completion (NOC) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.

✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.

✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **USGS 7.5 minute quadrangle name, township, range and section required.**
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached.**

✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Katy Sanchez

Katy Sanchez
Program Analyst

CC: State Clearinghouse

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

ARNOLD SCHWARZENEGGER
GOVERNOR

CYNTHIA BRYANT
DIRECTOR

March 4, 2009

Michael E. Wheeler
Humboldt County
3015 H Street
Eureka, CA 95501

Subject: Gravel Removal from the Lower Mad River, Humboldt County
SCH#: 1992083049

Dear Michael E. Wheeler:

The enclosed comment (s) on your Supplemental EIR was (were) received by the State Clearinghouse after the end of the state review period, which closed on March 2, 2009. We are forwarding these comments to you because they provide information or raise issues that should be addressed in your final environmental document.

The California Environmental Quality Act does not require Lead Agencies to respond to late comments. However, we encourage you to incorporate these additional comments into your final environmental document and to consider them prior to taking final action on the proposed project.

Please contact the State Clearinghouse at (916) 445-0613 if you have any questions concerning the environmental review process. If you have a question regarding the above-named project, please refer to the ten-digit State Clearinghouse number (1992083049) when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Senior Planner, State Clearinghouse

Enclosures
cc: Resources Agency

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HUMBOLDT COUNTY
PLANNING DIVISION

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 1, P. O. BOX 3700
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TTY (707) 445-6463

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March 2, 2009

1-HUM-101/299
Gravel Removal from the Lower Mad River
SCH# 1992083049

Michael Wheeler
Community Development Services
County of Humboldt
3015 H Street
Eureka, CA 95501

Dear Mr. Wheeler,

Thank you for giving us the opportunity to comment on the Draft Supplemental Programmatic EIR for Gravel Extraction on the Lower Mad River prepared by H.T. Harvey and Associates, dated January 9, 2009. 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 mouth of the Mad River (river mile 0) is located at about latitude 40°58'30" North, longitude 124°07'30" West. We have the following comments:

- We have no comment on the preferred administration of the County's SMARA program; however, it does appear that the CHERT program has had a beneficial effect on the overall stability of the Mad River and specifically our structures on Highway 101 and 299.
- Please note that our Mad River Bridges Replacement Project on Highway 101 is currently under construction. Our main concern for this project, and for all of our structures, is the long-term degradation of the river. Gravel mining has been a principle component of the historic problems along the Mad River and needs to be carefully regulated and monitored to protect the health of the river and our structures.

If you have questions or need further assistance, please contact me at the number above or contact Leishara Ward of District 1 Transportation Planning at (707) 441-4693.

Sincerely,

Leishara Ward
Associate Transportation Planner
District 1 Office of Community Planning

"Caltrans improves mobility across California"

Wheeler, Michael

From: Justin Ly [Justin.Ly@noaa.gov]
Sent: Monday, March 16, 2009 4:56 PM
To: Wheeler, Michael
Cc: leslie wolff; Dan Free; Shari Anderson; Margaret Tauzer; Ryan, Meghan
Subject: comments for the PEIR

Dear Mr. Wheeler,

Thank you for the opportunity to comment on the Mad River Draft Supplemental EIR. The following are NMFS' comments:

1. The proposed project and alternatives, as presented, are confusing. The proposed project is sometimes referred to as the preferred alternative, but is not clearly identified as an alternative, such as a "no action" alternative.

2. Currently the proposed project is identified as the CHERT adaptive management program, which includes other parties that are outside the discretion of the County. It would be clearer to reword the proposed project to reflect what actually is in the County's discretion. Therefore, the preferred (no action) alternative could be presented as continuing the CHERT team and its role, while the 1st alternative could be reworded as continuing the CHERT team and adding the SMAC.

3. There is a lot of emphasis on analyzing the effectiveness of the CHERT process and comparing habitat parameters before and after the CHERT formation. While analyzing the effectiveness of the CHERT program is important, what seems to be missing is the analysis of the gravel mining effects on an annual basis. To date, there has been no effective comparison of the mining cross sections (e.g., bank erosion, channel widening, etc) with reference cross sections of an unmined area. Recognizing that there are limited areas that are not mined with similar geomorphological features, we recommend including a reference cross section between the Leavey and Blue Lake Bars or other unmined sites. Examples of the missing gravel mining effects analysis are provided below:

A. Because bank erosion is heavily influenced by peak discharge, and peak discharge varies each year, it is extremely difficult, if not impossible, to assess whether bank erosion is caused by gravel mining for a particular year, when comparing between years because of too many dependent variables. In order to reduce the peak discharge variable, cross sections should be done in a reference unmined reach to compare each year with the mined reaches.

B. The Trush 2008 riparian vegetation analysis should evaluate actual riparian vegetation instead of acreage changes to channelbed types. The report classifies five channelbed types, and many of these channelbed types include substantial areas of nonvegetation, such as gravel beds. In their delineations of the channelbed types, the actual vegetation acreages are masked and unknown. It does not seem appropriate to title this report an analysis of riparian vegetation. Also, this report focuses on the effectiveness of the CHERT program and looks at differences before and after the CHERT formation, and does not attempt to look at gravel mining effects each year because reference areas of unmined reaches were not used to compare to mining reaches.

4. Table 5-6 on page 49 has a few incorrect regulatory status listings. The northern red legged frog is not federally listed as threatened, and is a CA species of concern. The northwestern pond turtle is a CA

species of concern, while the bullfrog is a non-native/invasive species.

5. Pg 69 Section 5.4.1: Mean annual recruitment is defined as "the volume of gravel replenished by natural processes over the previous year, for a given river segment." This definition seems incorrect and misses out on the meaning of "mean". Also, it is important to note that the regulatory agencies have not defined MAR as equal to 175,000 cubic yards, but rather acknowledged that 175,000 is within the range of the estimates of MAR that were available in 2004. We also note that since 2004, 175,000 is the maximum amount of gravel that can be extracted annually, not the average amount. Please elaborate on the value of using an estimate of mean annual recruitment for extraction limit and how the amount of extraction affects the mean annual recruitment. Also, how does CHERT account for the changes in the recruitment or transport capacity throughout the extraction reach?

If MAR is the average volume being annually deposited throughout the entire extraction reach, why is that same volume recommended for extraction at the mined bars, when the mined bars are only a fraction of the extraction reach?

6. Does the sustained yield volume equal the estimate of mean annual recruitment? We recommend including a detailed definition of both the MAR and sustained yield concepts.

7. Pg 70 Table 5-19 shows the latest estimates for mean annual recruitment to be lower than 175,000 (i.e., 135,000-155,000). If one of the objectives of the CHERT team is to "protect river form and function, while recommending extraction quantities that are within the estimated long-term average annual sustained yield amount," it does not seem apparent that the CHERT team has been recommending extraction amounts within the most recent MAR estimates. For instance, the CHERT recommended extraction volumes for 2006 and 2007 are 174,245 and 165,504 cy, respectively.

8. The flow charts that detail the flow of information, money and gravel do not accurately portray the regulatory agencies involvement in the pre-extraction data review, recommendation of extraction techniques and minimization measures, post-extraction review or analysis products. NMFS and CDFG provide the Corps with a consistency determination for each proposed gravel extraction on an annual basis prior to the Corps issuing the annual Letter of Modification that permits the extraction.

9. The statement on page 69 that "if gravel extraction remains below the MAR, long-term cumulative effects will likely remain less than significant" needs some further explanation.

If you have any questions regarding our comments, please feel free to contact me or Leslie Wolff.

Sincerely,
Justin Ly
NMFS
1655 Heindon Rd
Arcat

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Northern Region
601 Locust Street, Redding, CA 96001
http://www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor
DONALD KOCH, Director

March 18, 2009

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HUMBOLDT COUNTY
PLANNING DIVISION

Mr. Michael E. Wheeler
Senior Planner
Humboldt County Planning and Building Department
3015 H Street
Eureka, California 95501-4484

RE: Draft Supplemental Programmatic Environmental Impact Report (SCH #1992083049) for Gravel Extraction on the Lower Mad River, Humboldt County, California

Dear Mr. Wheeler:

On January 20, 2009, the Department of Fish and Game (DFG) received from the Humboldt County Department of Community Development Services (Lead Agency) a Draft Supplemental Programmatic Environmental Impact Report (DSPEIR, State Clearinghouse #1992083049) for the continuation of Gravel Extraction on the Lower Mad River (Project). While this response will not meet the deadline for DSPEIR comments, we ask that you consider our recommendations during preparation of the final supplemental programmatic environmental impact report.

As a trustee for the State's fish and wildlife resources, DFG has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants and their habitat. As a responsible agency, DFG administers the California Endangered Species Act (CESA) and other provisions of the Fish and Game Code that conserve the State's fish and wildlife public trust resources. DFG offers the following comments and recommendations on this project in our role as a trustee and responsible agency under the California Environmental Quality Act (CEQA, California Public Resource Code §21000 *et seq.*).

Project Site and Description

The Project site is located on the Lower Mad River between the DFG Mad River Hatchery in Blue Lake and the U.S. Highway 101 bridges, in Humboldt County, California. The Project proposes to "continue extraction of river-run sand and gravel, in limited quantities, from...sites located along the Mad River....in a manner that will provide a moderate rate of recovery from the past adverse impacts of channel degradation and will eliminate or minimize the adverse impacts of future mining activities" (HCPBD 1994).

Conserving California's Wildlife Since 1870

Mr. Michael E. Wheeler
March 18, 2009
Page Two

The DSPEIR proposed project is the continuation of the County of Humboldt Extraction Review Team (CHERT) adaptive management program. Two alternatives were also considered:

1. Reinstating the Surface Mining Advisory Committee (SMAC) and including it in the adaptive management program. SMAC would be comprised of representatives of the public, the operators, and gravel users. Its primary responsibilities would be to comment on CHERT reports and coordinate finances between CHERT and the operators.

2. Disbanding the CHERT scientist team but continuing the adaptive management program with County staff taking over the team's responsibilities.

The preferred alternative and the environmentally preferred alternative is the proposed Project (continuing the CHERT adaptive management program).

Listed and Special Status Species

The Mad River is a regionally-important fish-bearing stream that currently supports three listed salmonid species. Coho salmon (*Oncorhynchus kisutch*) is State- and federally-listed as "threatened." Chinook salmon (*O. tshawytscha*) and steelhead (*O. mykiss*) are federally-listed as "threatened." Other protected species that occur in the Lower Mad River and should be included in the CEQA analysis of impacts are the State-threatened (candidate) longfin smelt (*Spirinchus thaleichthys*) and the State-endangered willow flycatcher (*Empidonax traillii*). DFG has identified the Mad River coho salmon as a key population to maintain or improve as part of the *Recovery Strategy of California Coho Salmon* (DFG 2004). Since coho salmon use a variety of habitat features and depend on many different parts of the watershed, from upper reaches to estuaries, they are an indicator of watershed health (DFG 2007).

For coho salmon recovery (DFG 2004) and planning purposes the Mad River is identified as the Mad River Hydrologic Unit (470 square miles). The Project is located in the Blue Lake Hydrologic Subarea of the Mad River Hydrologic Unit. The Mad River coho salmon population has declined by 70% during the last 40 years (DFG 2004). The Mad River is listed pursuant to Clean Water Act §303(d) as impaired for sediment, turbidity, and temperature (NCRWQCB 2006). Coho declines in the Mad River basin are associated with a reduction in habitat diversity by channel aggradation and lack of conifer large woody debris (LWD), high fine sediment loading (in part from high road concentration in the watershed), and high water temperatures throughout the basin (DFG 2004).

State Species of Special Concern (SSC) are also present in the project area including the foothill yellow-legged frog (*Rana boylii*), northern red-legged frog (*Rana aurora*) and northwestern pond turtle (*Actinemys marmorata*). DFG designates certain vertebrate species as SSC because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction or extirpation in California. Though not listed pursuant to the federal Endangered Species Act (ESA) or CESA, the goal of designating taxa as SSC is to halt or reverse these species' decline by calling attention to their plight and addressing the issues of conservation concern early enough to help secure their long-term viability. Hence, the ultimate goal of the SSC designation is to avoid CESA or ESA listing.

Lower Mad River Gravel Extraction History and CHERT

Impacts to coho salmon that can result from gravel extraction include: direct mortality, loss of spawning habitat, noise disturbance, disruption of adult and juvenile migration and holding patterns, stranding of adults and juveniles, increases in water temperature and turbidity, degradation of juvenile rearing habitat, destruction or sedimentation of redds, increased channel instability and loss of natural channel geometry, bed coarsening, lowering of local groundwater level, and loss of LWD and riparian vegetation (DFG 2004). Historically, when gravel mining operated with virtually no environmental regulation, all of these impacts occurred (DFG 2007).

Before implementation of mitigation measures (i.e., CHERT) developed by the original Programmatic Environmental Impact Report (HCPBD 1994), the Mad River was over extracted and degraded in the lower reaches. Excessive extraction was the result, in part, from poor regulatory oversight and enforcement of Conditional Use Permits (CUPs), CEQA requirements and provisions of the Surface Mining and Reclamation Act (SMARA). In fact, many gravel extractors on the Mad River operated without a legal entitlement. Issuance of Lake or Streambed Alteration Agreements (LSAA) pursuant to Fish and Game Code (FGC) §1600 *et seq.*, was the only measure of administrative compliance or project environmental review. In an effort to fulfill its Trustee responsibility for aquatic resources on the Mad River, DFG made provisional conditions for FCG §1600 applications that required verification for Humboldt County authorization to extract gravel. As a result of this requirement, the amount of gravel requested for pre-existing CUPs, in combination with new permit application and vested right claims significantly exceeded the annual average recruitment of aggregate in the Mad River basin. New applications triggered CEQA and mandated that Humboldt County review each project for individual and cumulative effects.

In addition, DFG and the gravel industry had numerous disputes over annual extraction volume, extraction method and reclamation requirement (post-extraction bar shape). The industry often questioned the qualifications of biologists and wardens to develop mining standards. Conversely, DFG and others were skeptical of the gravel industry's annual estimate of aggregate removal or the final shape of gravel extraction sites.

These conflicts were resolved by designating four independent scientists (including two who had consulted for the gravel industry and DFG who were accepted by both DFG and the industry) as arbiter for the differing opinions on annual extraction method and volume. A fifth member, a riparian specialist also served on CHERT for several years; however, this position has been vacant or intermittently filled as needed for many years. The formation of the CHERT adaptive management program occurred in 1994. The objectives of the CHERT program are to: 1) provide independent scientific and technical review of gravel extraction proposals for extraction operations, 2) define and quantify the mean annual requirement of in-stream gravel, and provide annual in-stream gravel extraction prescriptions, and 3) protect river form and function, while recommending extraction quantities that are within the estimated long-term average annual sustained yield amount.

DFG supports objective, independent, and site-specific evaluation of gravel mining operations. Without CHERT (an independent scientific review team), there is a likelihood of increased conflict over proposed extraction methods, areas of extraction, and diminished protection of riverine resources. DFG supports the objectives and continuation of CHERT, and recommends that a qualified riparian specialist be re-instated within the CHERT review team.

Riparian Habitat and Wetland Resources

Riparian habitat performs a disproportionate number of biological and physical functions on a unit area basis and the restoration of riparian function along America's waterbodies should be a national goal (RHJV 2004). Such a goal is clearly mandated within the mission of the DFG and the Humboldt County General Plan (Streamside Management Area Ordinance). Besides the maintenance of fish and wildlife communities, numerous studies have shown that riparian habitat and their associated wetland systems also provide flood attenuation, groundwater recharge and discharge, surface water supply and replenishment, sediment transport and storage, nutrient and organic matter cycling, pollutant filtration, and temperature and microclimate control.

More than 225 species of birds, mammals, reptiles, and amphibians depend on California's riparian habitats (RHJV 2004). Despite the importance of wetlands and riparian habitat for abiotic and biotic ecosystem function, California and the North Coast have experienced a substantial loss of wetland and riparian habitat in the past 160 years. An estimated 93 to 98% of California's and 75% of the North Coast's riparian habitat has been converted (Katibah 1984, Dawdy 1989). Due to the high biological diversity of riparian habitat and the significant loss and degradation, riparian areas are the most critical habitat for the conservation of neotropical migrants and resident birds in the west (RHJV 2004). The loss of riparian habitats may be the most important cause of population decline among landbird species in western North America (DeSante and George 1994). Loss of riparian habitat has been implicated in the decline and subsequent listing of the willow flycatcher as endangered pursuant to CESA. The project area contains habitat for the willow flycatcher.

The DSPEIR contains two analyses pertaining to the status of riparian habitats within the project area. Natural Resources Management (NRM 2000a, 2000b, and 2000c) quantified riparian habitat based on the Cowardin et al., (1979) classification system in general terms as gained or lost from 1996 to 2000. The review of aerial photographs suggested a gain of 4.42 acres and a loss of 30.61 acres, which constitutes a net loss of 26.19 acres of riparian habitat. For the preparation of the DSPEIR, Trush (2008a) reviewed aerial photography, separating the extraction areas into three reaches, and quantified riparian habitat based on channelbed type. Trush (2008a) concluded that "overall net woody riparian vegetation abundance and diversity (among the 5 channelbed types) between WY [Water Year] 1994 and WY2007 have remained approximately the same. However, differences in acreage between WY1994 and WY2007 were observed within the three mainstem reaches."

Based on Trush (2008a), the DSPEIR concludes when using the Annie Mary Bridge as the dividing line between upstream and downstream sites, the total areas of channelbed types were approximately balanced from 1994 to 2007. Furthermore, the total WY2007 channelbed area for the project area as a whole (from Highway 101 bridges to the Blue Lake Hatchery) was 1,158 acres, so the net gain in channelbed area from 1994 to 2007 was less that 1%.

While the methodologies of these studies were different, making inference difficult, the DSPEIR concludes that riparian vegetation acreage has not increased significantly. This appears to mean the extent of riparian habitat has largely remained as it was in 1994. The significance of this inference becomes clear when considering the 1994 PEIR, before CHERT was established, stated the Lower Mad River was adversely impacted from past mining activities. As such, conditions with respect to riparian extent and condition have remained degraded. A goal of the 1994 PEIR (during the monitoring and planning phases) is to look for opportunities to mitigate past losses of riparian habitat (Veg-1 Mitigation M-1; HCPBD 1994). Furthermore, Veg-2 Mitigation M-3 of the 1994 PEIR states "...CHERT shall attempt to gain access and permission to initiate bank-stabilizing revegetation practices at sites where bank erosion is considered excessive, where revegetation may reduce the erosion rate, and especially where revegetation can be used to mitigate for current or cumulative losses in riparian habitat." Based on the status of riparian habitat reported in the DSPEIR, this goal has not been met and additional work toward satisfying this goal is required. To be consistent with the *Recovery Strategy of California Coho Salmon* (DFG 2004) and the 1994 PEIR, the final SPEIR must identify additional strategies to increase and improve riparian habitat in the Project area.

While river meandering and channel confinement by levees are undoubtedly a contributing factor, it is appropriate for the final SPEIR to identify restoration areas on the upland side (i.e., agriculturally cleared historical flood plain) and within the existing riparian habitat to expand riparian vegetation through restoration efforts while continuing to protect existing riparian habitat through CHERT review and prescription. Furthermore, stockpiling extracted materials and processing in the riparian areas should be discouraged. Stockpiles and processing should be moved beyond a 150-foot-wide riparian stand (a standard DFG recommendation for large river system buffers since 1994). This mitigation would be consistent with the *Recovery Strategy of California Coho Salmon*, recovery task MR-HU-03: "b) establish adequate streamside buffer areas (DFG 2004)."

Stewardship

Additional riparian restoration opportunities exist by controlling access to riparian areas and planting extensive road networks created by vehicular trespassing. Unlimited vehicular access leads to LWD removal, habitat degradation and disturbance, and illegal refuse dumping. DFG understands that controlling vehicular trespassing is challenging; however, restricting vehicular access is feasible. Effort must be taken to limit the resulting degradation caused by these activities to the maximum extant practicable.

Large Woody Debris

In general, the Project area has limited instream habitat including what is formed by LWD and has a simplified stream morphology. LWD plays a vital role in many North Coast stream ecosystems by shaping the channel, creating pools, and providing cover and feeding opportunities for aquatic organisms. In addition, LWD is a critical component of coho salmon rearing habitat. DFG noted during site visits that unrestricted vehicle access is contributing to the removal of LWD within the Project.

The 1994 PEIR states in Fish-6: Mitigation Mit-1, "information gathered during aquatic habitat monitoring (presence and significance of large woody debris) will be used to develop site-specific extraction prescriptions that will minimize adverse impacts and, where possible, enhance these river resource conditions." Although LWD deposited in extraction areas from flood flows is not removed, little effort has been made to increase the overall amount of LWD within the Project area. Gravel mining tends to significantly increase bank-full channel widths, which leads to reduced pool depths (Brown et. al, 1998). To mitigate this impact to critical salmon and steelhead habitat, LWD should be placed instream throughout the Project area. Since operators have the heavy equipment and skill necessary to install LWD, this recovery action should be relatively easy to implement. DFG can provide guidance for operators. This mitigation is consistent with the *Recovery Strategy of California Coho Salmon*, recovery task MR-HU-03: "c) increase the amount of in-channel LWD (DFG 2004)."

Bullfrog, Native Amphibians and Reptiles

The local, regional, and global decline of amphibians and reptiles is well established in the scientific literature (Lannoo 2005; Wake and Vrendenburg 2008). Habitat loss and fragmentation, invasive species, disease, and contaminants, are among the long list of cumulative and synergistic anthropogenic effects that are attributed to species decline.

The bullfrog (*Rana catesbeiana*) is a non-native invasive species that occupies aquatic habitat similar to the northern red-legged frog, foothill yellow-legged frog, and northwestern pond turtle. The bullfrog is generally considered a lentic (i.e., pond) habitat species; however, it will use slow water in rivers and streams. At the larval stage, the bullfrog negatively impacts the California red-legged frog through competition (Lawler et al.,1999), and mature bullfrog are predators of the California red-legged frog (Moyle 1973, Fisher and Shaffer 1996, Kiesecker and Blaustein 1997, USFWS 2002). It is a predator of numerous other native species including the northwestern pond turtle, foothill yellow-legged frog, northern red-legged frog, waterfowl, and passerines.

DFG is currently assessing the distribution of the bullfrog within the range of the northern red-legged frog (i.e., Mendocino, Humboldt, and Del Norte counties). The coastal plain of these counties presents many challenges to control the bullfrog from the high dispersal capabilities of the bullfrog, lack of thermal constraints (i.e., high humidity and precipitation), and numerous wetland, and private property ponds that may already be occupied by the bullfrog. The bullfrog currently occupies habitat within the northern red-legged frog's range and in close proximity to protected lands such as DFG wildlife areas.

Without active control of the bullfrog the northern red-legged frog will likely become threatened, similar to the California red-legged frog (*Rana draytonii*), the State's largest native frog. In 2002, recovery of the California red-legged frog was estimated to cost $10,031,500 plus costs that are yet to be determined (USFWS 2002). The DSPEIR incorrectly identifies the federally-threatened California red-legged frog as the species present within the Lower Mad River. The California red-legged frog does not occur north of the Elk Creek drainage in Mendocino County (Shaffer et al., 2004).

Conservation of extant northern red-legged frog, foothill yellow-legged frog, and northwestern pond turtle populations' hinge on successful control, eradication, and management of the bullfrog. DFG strongly recommends that gravel extraction methods not create lentic habitat suitable for the bullfrog. Wetland pits should not extend below the capillary fringe, or if they do they must be removed naturally by the river within the following high flow season, or the operator must be responsible for eradicating the bullfrog with DFG guidance. Undoubtedly, wetland pits do have habitat value for native species, however the habitat value is temporal, as the habitat will likely become invaded and ultimately a source population for bullfrogs.

The 1994 PEIR states that "in the study area, the bullfrog's specific status needs to be determined." The DSPEIR states that "no bullfrog management is planned for the Lower Mad River at this time, but use of mining created wetland pits should be considered among the issues should a management plan be developed in the future." The DSPEIR Notice of Preparation (NOP) response to DFG comments that "no effective eradication methods are presently known" is incorrect and a lack of action could lead to more species listing pursuant to CESA or ESA. Bullfrog control must be expedited and control and/or eradication should be a priority for the Project; it is in the best interest of the gravel industry, county, and resource agencies to stop the spread of this non-native invasive species.

Wildlife Surveys

In the 1994 PEIR, avian, mammalian, amphibians, and reptiles received attention and a similar mitigation measure: "Wild-1: Mitigation Mit-7. For at least the first five years of this project wildlife monitoring surveys similar to those conducted in the project area and at site specific extraction operations during 1993 will be continued. The Scientific Design and Review Committee (SDRC) [now CHERT] will consider comments from DFG, the wildlife surveys, and impacts to wildlife when developing annual mining strategies at affected sites. The need for continuing wildlife surveys after the first five years will be considered during the first five-year comprehensive review (HCPBD 1994)." DFG is not aware that this review was completed. The DSPEIR notes that "wildlife species information specific to gravel extraction on the Lower Mad River is limited; only one study was obtained, by Mad River Biologists (1993)." Trush (2008) concluded that "no inventories have been preformed in the Lower Mad River to establish amphibian habitat abundance or population trends between WY1994 and WY2007." Similarly, the DSPEIR is silent on willow flycatcher surveys or presence/absence, but notes that "whether this species will become prevalent in the Lower Mad River is unknown, but since early 1990s, more sightings seem to have been recorded."

These results suggest a general paucity of data, and therefore, DFG is unclear how informed conclusions could be drawn regarding potential effects on the aforementioned species. It appears that the intent of Wild-1: Mitigation Mit-7 has not been met. If these data exist, then they should be analyzed and reported in the final SPEIR and referred to DFG for review and comment. DFG understands that extraction could occur as early as mid-June of each year, which would be within the breeding season for nesting avian species and amphibian larvae metamorphoses and dispersal.

Recommendations

1. Adopt the Proposed Project and the environmentally preferred alternative and continue the CHERT adaptive management program.

2. Re-instate a qualified riparian specialist on the CHERT review team to actively participate in all CHERT related activities before the next extraction period and for the life of the Project.

3. The final SPEIR shall identify and implement riparian restoration on the upland side (i.e., agriculturally cleared historical flood plain) and within the existing riparian habitat to expand riparian vegetation through restoration efforts while continuing to protect existing riparian habitat through CHERT review and prescription. The final SPEIR shall identify restoration areas for riparian restoration and an implementation schedule, which shall be followed.

4. Extraction stockpiles and processing shall be discouraged within a 150-foot riparian stand along each side of the Mad River and where practicable re-established beyond a riparian boundary of 150 feet.

5. Operators shall restrict unauthorized vehicular access to riparian habitat and river channel to the maximum extent practicable to reduce habitat degradation, LWD removal, and illegal refuse dumping.

6. Wetland pits shall not extend below the capillary fringe, or if they do they must be removed naturally by the river within the following high flow season, or the operator must be responsible for eradicating the bullfrog with DFG guidance.

7. To mitigate increased bank-full width, streambed simplification, and reduced pool depths, LWD shall be placed instream throughout the Project area according to a plan prepared by CHERT submitted within one year of adoption of the SPEIR for review and approval by DFG.

8. Wildlife survey data shall be analyzed and reported in the final SPEIR and referred to DFG for review and comment. If wildlife surveys are lacking then they shall be completed consistent with the original intent of the 1994 PEIR.

If you have any questions or comments regarding this matter, please contact Environmental Scientist Michael van Hattem at (707) 445-5368 or Environmental Scientist Scott Bauer at (707) 441-2011 at 619 Second Street, Eureka, California 95501.

Sincerely,

for **GARY B. STACEY**
Regional Manager

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Wheeler, Michael

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Sent: Friday, March 20, 2009 3:43 PM
To: Wheeler, Michael
Cc: Kerns, Jack SPN
Subject: Draft Supplemental Programmatic Environmental Impact Report for Gravel Ext. on Lower Mad River.`

Since the Supplemental PEIR is intended as a review of the effects of gravel mining and the use of the CHERT process, the S-PEIR should also consider the possible impacts of the Blue Lake Rancheria's proposed extraction of 5000-20,000. I understand that the tribe is beyond the authority of the County, which is why the effects thereof should be considered in the cumulative effects section and not in the alternatives section. Otherwise, the S-PEIR would be obsolete as soon as the Rancheria begins extracting, if they do.

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APPENDIX B.
Additional Information on Riparian Habitat

APPENDIX B.

This text was in the 2011 Administrative Draft of the Supplemental Programmatic EIR, but we have deleted it from the 2012 PEIR because it was overly detailed. However, useful information is provided so we have included it in this Appendix.

Riparian Habitat

Vegetation conditions of the Mad River watershed are generally described in the Humboldt County Draft General Plan Update, which classified vegetation into types familiar to the general public (**Table** Error! No text of specified style in document.**-1**). Approximately 80% of the Mad River Planning Watershed is fir or redwood forest, or oak woodlands.

Table Error! No text of specified style in document.**-1. Vegetation distribution in Mad River Planning Watershed (HCDCDS 2008)**

Vegetation	Percentage of distribution
Fir forest	37
Redwood	24
Oak woodlands	20
Annual grass	8
Pine forest	6
Chaparral	2
Riparian	1
Agriculture/crops	1
Coastal scrub	1

Four detailed studies specific to the riparian conditions of the Lower Mad River have been performed since 1994; they are:

- [NRM] Natural Resources Management. 2000a. Riparian vegetation assessment, Emmerson and Blue Lake bars. Eureka (CA): Natural Resources Management.
- [NRM] Natural Resources Management. 2000b. Riparian vegetation assessment, Christie bar (includes Johnson Bar). Eureka (CA): Natural Resources Management.
- [NRM] Natural Resources Management. 2000c. Riparian vegetation assessment, Guynup bar. Eureka (CA): Natural Resources Management.
- Trush, B. 2008a. Lower Mad River woody riparian vegetation trend between WY1994 and WY2007.

METHODOLOGY AND MONITORING

The methodologies of NRM (2000a, 2000b, 2000c) and Trush (2008a) were generally similar. Aerial photographs over time were obtained. The photos were viewed, and areas of varying vegetation communities were delineated, estimated, and summed. Observation in the field verified that vegetation was correctly identified from the aerial photos. Thus over time, areal changes in various vegetation communities could be documented.

The NRM and Trush methodologies differ in the vegetation types identified and the degree of detail in which the photos were viewed. Also, the NRM study occurred in 2000, and so obviously does not include analyses of more recent years; the NRM study describes photographs that were taken between 1996 and 2000, which covers only a portion of the CHERT program's activities. Trush (2008a) has the advantage of using more recent data (2007 aerial photos), and begins the trend analysis in 1994, coincident with air photo availability, which is two years after the CHERT program began.

Riparian Vegetation Trends

An analysis of riparian vegetation trends must consider not only areal extent (quantity) but also community structure (quality). Change in riparian area is the conceptually easier metric of the CHERT program's effects and will be described first. However, quantity alone does not indicate whether riparian conditions have improved or worsened since the CHERT program began; qualitative changes will also be discussed.

When reviewing riparian area changes that are greater than 1 acre, the NRM studies noted these gains and losses in acreages of riparian vegetation (**Table** Error! No text of specified style in document.**-2**). Only the "upper" sites were surveyed, and the change in area is what occurred in four years (from 1996 to 2000).

Table Error! No text of specified style in document.**-2. Changes in riparian vegetation from 1996 to 2000, selected sites on the Lower Mad River (NRM 2000a, 2000b, 2000c)**

Location	Vegetation type	Area gained (acres)[a]	Area lost (acres)[a]
Emmerson and Blue Lake bars	Palustrine Forested broad-leaved deciduous/black cottonwood, *Populus balsamifera* ssp. *trichocarpa* (POBA) with some Fremont cottonwood (*P.fremontii* ssp. *f.*), mixed willow (*Salix* sp.), and red alder (*Alnus rubra*)	--	7.72
	Palustrine Scrub-Shrub broad-leaved deciduous/ black cottonwood, *Populus balsamifera* ssp. *trichocarpa* (POBA)	--	7.02
Christie bar (includes Johnson Bar)	Palustrine Scrub-Shrub broad-leaved deciduous with narrow-leaved willow (*Salix exigua*)	--	8.80
	Palustrine Scrub-Shrub broad-leaved deciduous/mixed willow	4.42	--
	Palustrine Scrub-Shrub broad-leaved deciduous/ black cottonwood, *Populus balsamifera* ssp. *trichocarpa*	--	7.07

[a] Includes areas that increased or decreased by more than 1 acre.

Areas classified by NRM (2000a, 2000b, 2000c) as "riverine lower perennial" included perennial areas of open water, emergent and non-persistent vegetation, emergent and persistent vegetation, unconsolidated bottom, and rocky shore. No changes in these areas were noted from 1996 to 2000.

Riparian vegetation was classified differently by Trush (2008a). Classifications were based primarily on channelbed types with riparian vegetation noted but not used as the single criterion to define classification. Individual extraction sites were not surveyed; instead the Lower Mad River was separated into three reaches, separated by the Highway 299 bridge and the Annie and Mary "trestle" (the railroad bridge) to provide a more comprehensive analysis. Trush (2008a) reports:

> "Overall net woody riparian vegetation abundance and diversity (acreages among the 5 channelbed types) between WY1994 and WY2007 have remained approximately the same. However, differences in acreage between WY1994 and WY2007 were observed within the three mainstem reaches."

The statements are supported by these area estimates (**Table** Error! No text of specified style in document.**-3** and **Table** Error! No text of specified style in document.**-4**).

Table Error! No text of specified style in document.**-3. Channelbed type areas from WY1994 and WY2007, from the Highway 101 bridge, upstream to the Annie and Mary Bridge (Trush 2008a)**

Channelbed Type	RT. 101 Bridge to RT.299 Bridge		RT. 299 Bridge to Annie Mary Bridge	
	Area in acres			
	WY1994	WY2007	WY1994	WY2007
Active	17.0	16.1	28.6	26.9
Floodplain	12.2	3.8	7.7	8.4
Open	71.8	62.1	51.9	52.2
Terrace	0.0	0.0	0.0	0.0
Woodland	58.9	72.6	10.4	8.6
Total	159.9	154.6	98.6	96.1

Table Error! No text of specified style in document.**-4. Channelbed type areas from WY1994, WY1997, and WY2007, from the Annie and Mary Bridge, upstream to the Blue Lake Hatchery (Trush 2008a)**

Channelbed type	Area in acres		
	WY1994	WY1997	WY2007
Active	110.1	230.6	189.5
Floodplain	120.4	81.7	102.7
Open	175.0	124.3	161.8

Terrace	397.3	388.7	347.5
Woodland	94.5	72.4	106.1
Total	897.4	897.7	907.7

Using the Annie and Mary bridge as the dividing line between upstream and downstream sites, the total areas of channelbed types were approximately balanced from 1994 to 2007; from the Highway 101 bridge to the Annie and Mary bridge, total channelbed area lost was 7.8 acres (about -3%). From the Annie and Mary bridge to the Blue Lake Hatchery, the total channelbed area gained was 10.3 acres, which is a net gain of 2.5 acres (about +0.3%). The total WY2007 channelbed area for the project area as a whole (from the Highway 101 bridge to the Blue Lake Hatchery) was 1,158 acres, so the net gain in channelbed area from 1994 to 2007 was less than 1%.

Although riparian vegetation acreage has not increased significantly since the CHERT program began, a number of extraction practices have increased the quality of riparian habitat. One such extraction practice is the creation of "gravel pit wetlands," which mimic "oxbow lakes common in wide alluvial rivers" (Trush 2008a). The wetland pits are expected to be short-lived because they are typically obliterated by high flows within 2-5 years after their construction, depending on storm intensities. During the time that the wetland pits are present, they "provide abundant, high-quality avian and amphibian habitat" (Trush 2008a). In addition, CHERT recommendations minimize: 1) "any disturbance of existing woody riparian vegetation", and 2) "interference with the gradual colonization of recent depositional surfaces, aggrading floodplains, and re-worked flood terraces" that are created as the channel migrates naturally (Trush 2008a), which together limit gravel extraction's effects on riparian vegetation.

APPENDIX C.
Lower Mad River Woody Riparian Vegetation Trend between WY1994 and WY2007 (Trush 2008)

Lower Mad River Anadromous Salmonid Habitat Trends Between WY1994 and WY2007

Introduction

All anadromous salmonids must pass through the Lower Mad River mainstem on their way up and/or down from the Mad River Watershed. This gateway to the watershed provides several critical functions for sustaining salmon and steelhead populations. Primary mainstem functions are to provide abundant, safe, and high-quality habitat for a number of salmonid species and life stages (Table 1).

Table 5. Primary mainstem functions of the Lower Mad River for Anadromous Salmonids.

Species	Life stage	Run timing	Habitat required
salmon	adult	Upstream migration in fall	Holding in mainstem
“winter” steelhead	adult	Upstream migration in fall	Holding in mainstem
“summer” steelhead	adult	Upstream migration early summer	Holding in mainstem
Chinook salmon	fry and juveniles	Spring, early summer	Rearing
Chinook, coho, steelhead	smolts and pre-smolts	Downstream migration in late-winter through mid-summer	Feeding and smolting

Secondary mainstem functions are to provide abundant and high-quality habitat for: (1) coho and steelhead juveniles residing from mid-summer through early-autumn and (2) Chinook salmon spawning in October through mid-January. The ‘secondary’ status of these functions does not imply that these life stages are not vital to sustaining fish populations. However, in the Lower Mad River mainstem, both life stages likely do not have a prominent role in sustaining or recovering the watershed’s annual adult anadromous salmonid runs. Refer to Humboldt Bay Municipal Water District (2004) for a review of background life history information relevant to the Lower Mad River.

CHERT’s objective was to maintain, and if possible improve, all these fishery functions while practicing sustainable aggregate extraction. In 1994, the common belief and partial reason for establishing CHERT, was that salmon and steelhead habitat was impaired and that aggregate extraction was a primary cause. In the initial years of CHERT, the emphasis was on determining and establishing the amount of sustainable annual extraction and applying approved extraction methods that would least disturb the river.

In the mid-1990s, no baseline was measured or established from which to gauge CHERT's success or failure, with respect to salmon and steelhead habitat trends in the future. However, two data sources have become available for evaluating anadromous salmonid habitat in the Lower Mad River since 1994. The best source is the annual habitat surveys funded by the gravel operators and performed in the field by Dennis Halligan, Andrew Jensen, and others, since the mid-1990s (Stillwater 2008). Earlier surveys focused on physical measurements of channel features (e.g., residual pool depths and pool/riffle/flatwater ratios) and fish observations; direct habitat quantification was added beginning in 2002. For a summary of physical measurements since 2002, refer to Tables 1 and 2 in Stillwater (2008). These annual surveys are too few to document habitat abundance trends since CHERT's formation, but they are an excellent beginning for anchoring such a trend.

CHERT's requirement for annual aerial photography was considered a key monitoring component, and not only a tool for designing extraction plans. Funded by a Coastal Conservancy Fish Passage Design grant with Trinity County, and the Five Counties Salmonid Conservation Program, Trush (2005) attempted to quantify anadromous salmonid habitat dating back to the late-1940s by interpreting aerial photographs. This pilot study's objective was to contrast contemporary anadromous salmonid habitat with earlier periods, going as far back as the aerial photography allowed. CHERT anticipated that these comprehensive aerial photographs would provide a baseline from which to evaluate long-term trends.

The primary objective of this analysis is to document trends in anadromous salmonid habitat abundance between WY1993 and WY2007 using the aerial photography, to ascertain if the CHERT program has helped improve habitat conditions.

Quantifying Salmonid Habitat from Aerial Photographs

Mainstem Lower Mad River habitat was quantified for three anadromous salmonid life history stages:

- 2+ juvenile steelhead rearing,
- 1+ juvenile coho salmon, and
- adult salmon and steelhead upstream migration.

Juvenile 2+ steelhead, having spent two winters in the watershed, become relatively large smolts. They prefer streamflow greater than 1.5 ft deep, water

velocities between 1.5 ft/sec and 3.0 ft/sec, and a coarse substrate or overhead cover. Juvenile 1+ coho salmon, having spent one winter in the watershed, also become relatively large smolts. Their habitat preferences include slow streamflows (less than 1 ft/sec) through shaded, physically complex substrate formed by accumulations of large woody debris and/or under overhanging banks. Good adult salmon holding habitat during upstream migration is generally in pools greater than 6 ft deep with ample cover. Adult steelhead will congregate in shallower habitats provided there is dense overhead cover, such as under a debris jam. Refer to Humboldt Bay Municipal Water District (2004), Trush (2005), and Stillwater (2008, and references therein) for detailed descriptions of life history characteristics and physical habitat needs in the Lower Mad River.

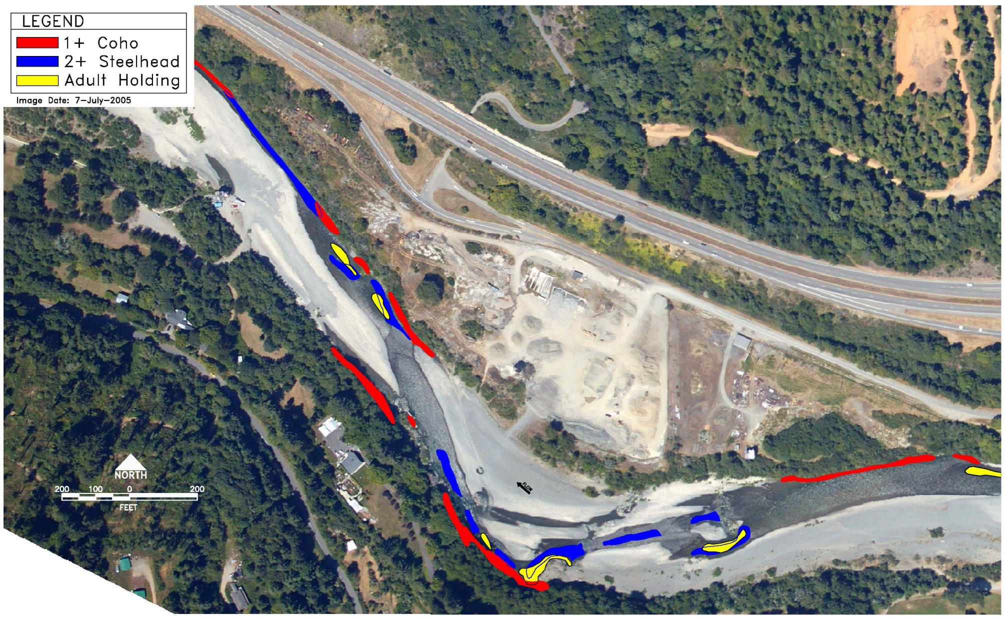
CHERT's primary strategy is to recommend gravel extraction while not significantly interfering with physical channel processes necessary to achieve as physically complex a mainstem channel as possible. If physical channel complexity improves, habitat abundance for these three life stages also should improve. Rather than infer habitat from physical measurements (e.g., pool depth and riffle width), this analysis quantified anadromous salmonid habitat directly.

Habitat Mapping Anadromous Salmonid Habitat

The premise for habitat mapping is simple. Fisheries biologists can quantify fish habitat by recognizing and measuring it in the field, then mapping it onto basemaps generated by aerial photography. If considered habitat by the fisheries biologist, each hydraulically complex portion of channelbed is drawn onto this basemap. Each identified patch of channelbed that is considered habitat is called a 'habitat polygon.' Once all habitat polygons have been recorded on one year's set of aerial photo basemaps, the polygons are digitized then compiled to estimate habitat abundance (ft^2) for that year. The basemap must be of sufficient scale to draw each habitat polygon boundary with reasonable accuracy and efficiency. Although habitat mapping was meant to be performed while on the river (as accomplished in annual habitat surveys sponsored by the operators), habitat mapping from aerial photography is the best alternative when attempting an historical perspective, i.e., going back in time to quantify habitat abundance trends up to the present. Spawning habitat requires close inspection of the channelbed to assess whether a favorable particle size is present. Spawning habitat mapping from aerial photographs was not attempted because channelbed particle size composition cannot be determined. For more detail on the habitat mapping methodology employed on the Lower Mad River refer to Stillwater (2008) and Trush (2005). An example of habitat mapping of Essex Bar in WY2005 is provided (Figure 1).

The three life stage habitats were mapped on aerial photographs taken during 1948, 1954, 1962, 1966, 1970, 1981, 1988, 1994, 2000, 2003, and 2005 (Trush 2005). The photographs were not at the same scale and some were black and white. Only aerial photographs taken at baseflows were considered for analysis. (Trush (2005) describes each year's aerial photographs included in the habitat mapping.) Aerial photographs covering Blue Lake Bridge to the Hwy 101 Bridge, were digitally manipulated ("rubber-sheeted") to USGS Digital Orthophoto Quadrangles (DOQ), which were geo-corrected to the California Stateplane Nad83, feet coordinate system.

Figure 1. Example of habitat mapping polygons at Essex Bar in WY2005, of juvenile 2+ steelhead rearing, juvenile 1+ coho rearing, and adult salmon/steelhead holding habitats.



For the purposes of this habitat trend analysis, aerial photographs from 1994 onward were evaluated to span CHERT's management period. Trush's 2005 study was reviewed (each year re-examined for consistency) and updated by quantifying salmon and steelhead habitat from a set of 2007 aerial photographs. Earlier periods of assessed habitat abundance in Trush (2005) were provided in the results of this trend analysis so that contemporary habitat abundance could be compared with historic levels.

Habitat mapping from aerial photographs resulted in higher habitat abundances for all life stages than those estimated from direct surveying and mapping (Stillwater Sciences 2008). Aerial photographs used in the earlier study (Trush 2005) were taken during late-spring baseflows, considerably higher (up to approximately 400 cfs) than the 50 cfs to 80 cfs summer baseflows occurring during the direct observation and surveys (although the polygons were drawn onto the same aerial photographs). The juvenile 2+ habitat estimated by direct observation and surveying was for juveniles 'residing' through the summer. In this analysis, these summer-resident steelhead juveniles and those juveniles, pre-smolts, and smolts were considered to be actively migrating through the mainstem in spring and early-summer (and likely less constrained by channelbed composition). This consideration resulted in quantifying more habitat.

Juvenile 1+ coho habitat is generally associated with dead (LWD) and/or living woody riparian vegetation. Most juvenile coho habitat is created when the mainstem channel flows against/along a woody bank. From an aerial photograph, the actual bank margin is obscured by the trees' canopies. Only portions of a woody bank will offer good juvenile coho habitat, but which portion cannot be discerned from the obscured bank in aerial photographs. Habitat mapping in the field can discern good habitat along a wooded bank . Similar estimating differences occur when quantifying juvenile 2+ steelhead habitat. While an aerial photo interpretation can reasonably locate areas of sufficient depth and velocity, favorable channelbed particle size cannot be determined. A diverse cobblebed surface is important for steelhead seeking cover and velocity refuge. Habitat mapping from aerial photographs is expected to over-estimate habitat abundance, but it can reasonably identify relative trends in habitat abundance.

Results

Total anadromous salmonid habitat for the three life stages has improved since the mid-1990's, though not dramatically or evenly (Table 2).

Table 6. Estimated abundances (ft^2) of juvenile 2+ steelhead, juvenile 1+ coho, and adult salmon/steelhead holding habitats in Lower Mad River, as determined by habitat mapping of aerial photographs for selected water years between WY1948 and WY2007.

	1+ Coho Juvenile Rearing Habitat Area (ft^2)			
Water Year	101 Bridge to 299 Bridge	299 Bridge to Annie-Mary Trestle	Annie-Mary Trestle to Blue Lake Bridge	Total
1948	181,931	141,272	72,873	396,077
1954	78,415	27,436	97,388	203,239
1962	24,059	19,687	26,684	70,430
1966	32,320	43,946	62,266	138,531
1970	76,323	87,791	76,893	241,007
1981	140,862	61,600	39,847	242,308
1988	200,913	84,719	96,706	382,337
1994	168,742	109,529	60,523	338,794
2000	180,979	104,098	58,716	343,793
2003	172,952	126,290	87,191	386,432
2005	203,604	108,312	93,319	405,236
2007	200,743	110,068	53,680	386,429

2+ Steelhead Juvenile Rearing Habitat Area (ft^2)				
Water Year	101 Bridge to 299 Bridge	299 Bridge to Annie-Mary Trestle	Annie-Mary Trestle to Blue Lake Bridge	Total
1948	101,308	69,739	98,655	269,702
1954	107,775	33,721	195,722	337,218
1962	41,081	25,947	83,825	150,852
1966	119,437	56,236	127,415	303,089
1970	32,817	29,792	95,001	157,610
1981	88,781	76,652	113,339	278,771
1988	69,192	83,599	82,632	235,423
1994	64,422	156,082	138,827	359,331
2000	141,819	126,661	93,937	362,417
2003	86,339	107,695	123,405	317,439
2005	117,563	100,608	116,941	335,112
2007	203,513	134,674	125,480	525,479

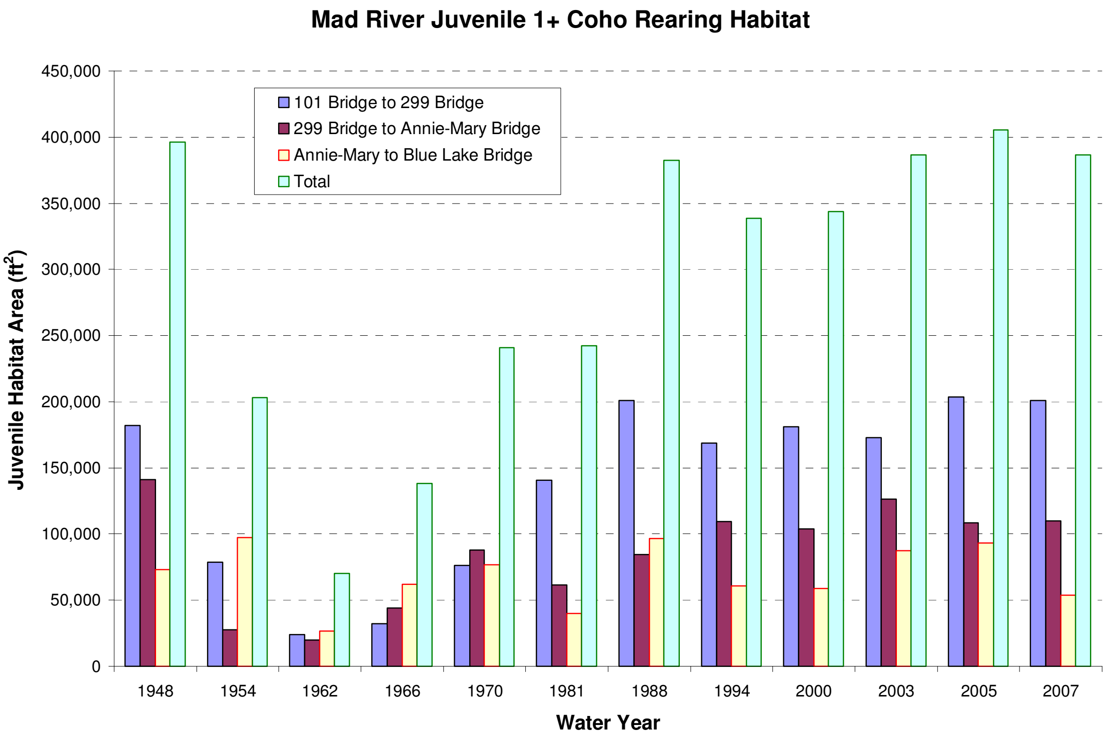
Adult Salmonid Holding Habitat Area (ft^2)				
Water Year	101 Bridge to 299 Bridge	299 Bridge to Annie-Mary Trestle	Annie-Mary Trestle to Blue Lake Bridge	Total
1948	42,870	23,924	53,215	120,009
1954	21,713	14,656	29,758	66,127
1962	26,854	17,628	11,563	56,044
1966	9,121	38,649	29,863	77,633
1970	10,185	13,148	14,983	38,316
1981	50,343	32,126	22,510	104,979
1988	25,849	58,432	19,644	103,925
1994	40,797	27,228	42,216	110,241
2000	29,312	21,757	18,236	69,305
2003	55,471	30,902	32,925	119,298
2005	31,804	34,700	29,862	96,365
2007	68,205	31,371	58,111	175,310

Closer evaluation of the habitat mapping data by species and life stage revealed the following trends since WY1948 to WY2007.

Juvenile 1+ Coho Habitat

The best 1+ coho habitat occurs between the Rt. 101 Bridge and Rt. 299 Bridge, where the mainstem channel flows into, and along, banks with dense riparian woodland. In contrast, the mainstem channel above Annie Mary Trestle typically meanders through broad alluvial deposits, and only occasionally encounters mature woody riparian vegetation along its banks. The overall trend in juvenile 1+ coho habitat abundance since WY1994 has been slightly upward (Table 1), approximately a 10% increase. In part, this modest trend would have been steeper if large woody debris inputs from upstream reaches were greater. Unfortunately, pervasive wood cutting along numerous access roads greatly reduces any significant retention of large and long fallen trees. An historic habitat trend shows habitat abundance relatively low compared to the 1950's through early 1980's (Figure 2).

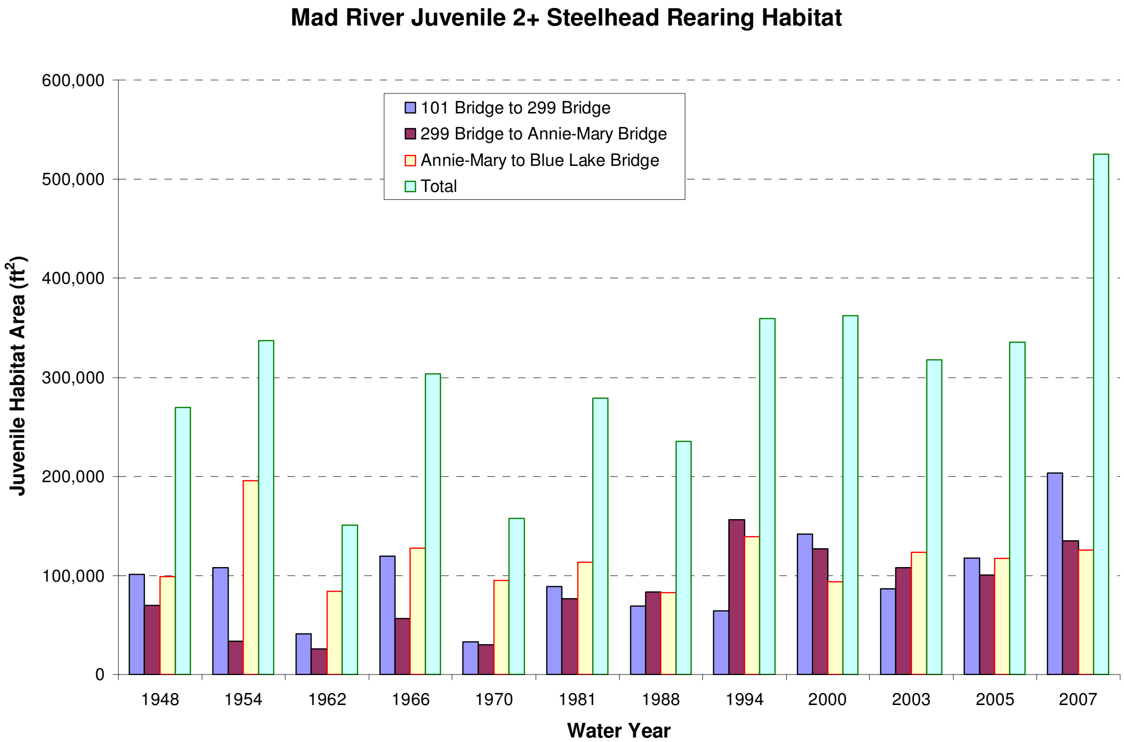
Figure 2. Estimated juvenile 1+ coho rearing habitat in the Lower Mad River between WY1948 and WY2007 from the Highway 101 bridge, upstream to the Blue Lake bridge.



Juvenile 2+ Steelhead Habitat

The amount of juvenile 2+ steelhead rearing habitat among the three mainstem reaches has remained approximately similar and steady since WY1994 (Table 2). Historic habitat trends (Figure 3) indicate that total juvenile 2+ steelhead habitat had already improved by the mid-1990's, although habitat abundance in WY1994 between the Highway 101 bridge and the Rt. 299 bridge appears to be recovering since WY1994. Annual bedload is becoming more available, due to the sustained yield cap on annual extraction, which manifests as deposition and storage below the ONeill Bar (one meander downstream of the Rt. 299 bridge). The aggrading mainstem channel within this narrow river corridor creates deeper and coarser riffles, which are favored as habitat by juvenile 2+ steelhead. Eventually, when the mainstem channel cannot store even more coarse bed material, the amount of juvenile 2+ steelhead habitat should become constant.

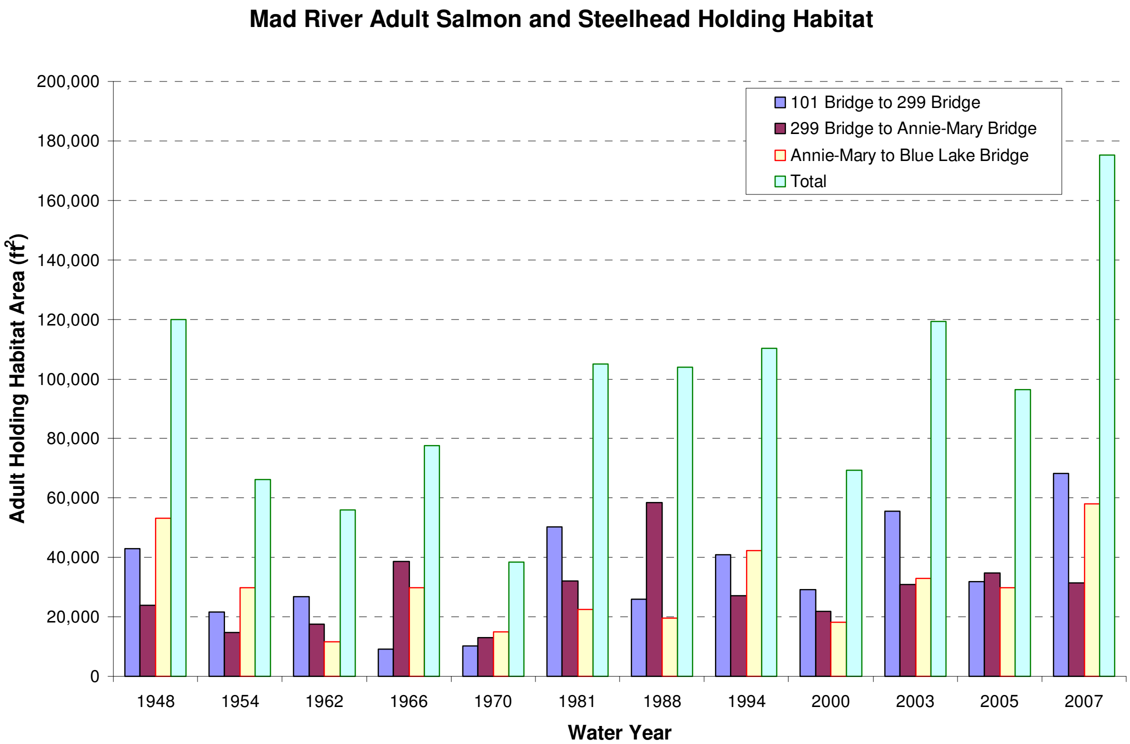
Figure 3. Estimated juvenile 2+ steelhead rearing habitat in the Lower Mad River between WY1948 and WY2007 from the Highway 101 bridge, upstream to the Blue Lake bridge.



Adult Salmon and Steelhead Holding Habitat

Following the high floods in WY1995 through WY1997, mainstem alignment abandoned a few deep pools and consequently decreased adult holding habitat availability (Figure 4). Since approximately WY2000, adult holding habitat seems to be increasing although inter-annual variability is considerable.

Figure 4. Estimated adult salmon and steelhead holding habitat in the Lower Mad River between WY1948 and WY2007 from the Highway 101 bridge, upstream to the Blue Lake bridge.



Riffle Crest Depths and Adult Salmon/Steelhead Passage

Adult passage through the Lower Mad River cannot be readily discerned from aerial photographs. Wider riffles tend to be shallower, and therefore tend to present greater upstream passage difficulty to adult salmon and steelhead. Subtle changes in thalweg depth make habitat abundance estimates from aerial photographs highly speculative. Fortunately, riffle depths have been measured as part of the annual fish surveys. Although these measurements do not extend back to WY1994, they provide insight into potential fish passage problems.

The riffle crest depth, where the riffle transitions into a pool or run upstream, typically is the shallowest depth along an adult salmon's migratory pathway through a riffle. Riffles flowing through large transverse bars usually are the shallowest locations in the Lower Mad River during baseflows. The wetted portion of transverse bars during baseflows is broad in width, but short in length, relative to other mainstem riffles.

During low summer baseflows, annual inventories of riffle crest depths averaged 0.9 ft deep (Table 2 in Stillwater 2008). The depth of streamflow that just covers the back of a swimming adult Chinook salmon is approximately 0.8 ft. The three shallowest riffle crest depths in the 2007 habitat survey were 0.3, 0.4, and 0.4 ft deep. All three were located on sharply angled transverse bars. Transverse bars observed over the years by

Halligan, Trush, and others (HSU students in past Coastal Stream Management classes) were not barriers to salmon migration. Adult salmon were not found "stacked-up" immediately downstream and adults were observed upstream, even under late-summer baseflows. A migrating adult salmon bursting over the shallow riffle crest of these broad transverse bars is partially exposed and briefly vulnerable. Continued annual surveys that document riffle crest depths are advised, but they will not resolve the question of transverse bars creating barriers to fish passage. Annual inventories do not yet extend long enough to establish a trend.

[Transverse bars are natural features that are extremely common in larger alluvial rivers. Asserting that the alluvial Lower Mad River has more transverse bars than it "should", ostensibly due to gravel extraction, might be irresolvable. Avoidance of skimming near the heads of point bars on the Lower Mad River reduces potential channel widening that might also lessen the occurrence of transverse bars.

Direct Versus Indirect Habitat Quantification

Considerable variability in habitat abundance from one year to the next was documented from (1) habitat mapping of the aerial photographs (Figures 1 through 3) and (2) Halligan's annual field-derived estimates (Stillwater Sciences 2008, Table 3). However, annual measurement of physical variables, that are often considered surrogates indicative of anadromous salmonid habitat, varied considerably less (Stillwater Sciences 2008, Tables 1 and 2). For example, average maximum pool depth in WY2004 through WY2006 was 6.2 ft and 5.7 ft in WY2007 (Stillwater Sciences 2008, Table 2).

Summary

Anadromous salmonid habitat abundance in the Lower Mad River is not static and can rapidly change, as found in this report from 1994 to 2007. Though considerable variation in total habitat abundance occurred annually, there has been modest, overall improvement since 1994 and significant improvement compared to habitat abundance in the 1950's through early 1980's. Habitat mapping from aerial photographs provided a quantitative approach for estimating historic habitat abundance. But aerial photographic interpretation should not be considered equivalent to habitat quantified from actual field surveys. Although there is always room for improvement, future monitoring should continue along the present methodology practiced on the Lower Mad River since 2002.

Literature Cited

Humboldt Bay Municipal Water District (HBMWD). 2004. Habitat Conservation Plan for Its Mad River Operations. Final Approved HCP – April 2004. Prepared by Trinity Associates and Humboldt Bay Municipal Water District. 58 p. and Appendices.

Stillwater Sciences. 2008. 2007 Fisheries monitoring program report for gravel extraction operations on the Mad, Eel, South Fork Eel, Van Duzen, and Trinity rivers, California. Prepared by Stillwater Sciences, Arcata, California for Humboldt County Gravel Operators.

Trush, W.J. 2005. Pilot Anadromous Salmonid Habitat Mapping Project for the Lower Mad River. Prepared for, funded by, a Coastal Conservancy Fish Passage Design grant with Trinity County and Five Counties Salmonid Conservation Program, November 16, 2005, 7 p. with figures and table.

APPENDIX D.
Additional Information on the Geologic and Hydrologic Environment

APPENDIX D.

This text was in the 2011 Administrative Draft of the Supplemental Programmatic EIR, but we have deleted it from the 2012 PEIR because it was overly detailed. However, useful information is provided so we have included it in this Appendix.

GEOLOGIC AND HYDROLOGIC ENVIRONMENT

The geologic and hydrologic environment was described in the 1994 PEIR, but much has been learned since then. Specific to the geologic environment of the Mad River, several reports provide new information:

- Kondolf, G.M. and E. Lutrick. 2001. Changes in bed elevation and sediment storage in the Mad River, 1970-1999. Arcata (CA): Eureka Ready Mix.
- Knuuti, K. and D. McComas. 2003. Assessment of changes in channel morphology and bed elevation in the Mad River, California, 1971-2000. San Francisco (CA): U.S. Army Corps of Engineers.
- Lehre, A.K., W.J. Trush, R.D. Klein, and D. Jager. 2005. CHERT historical analysis of the Mad River: 1993-2004. Humboldt County Board of Supervisors.
- Lehre, A.K., R.D. Klein, D. Jager, and W.J. Trush. 2009. CHERT historical analysis of the Mad River: 2004-2007 update. Humboldt County Board of Supervisors.
- [NMFS] National Marine Fisheries Service. 2010. Biological Opinion – Mad River batched gravel mining. National Marine Fisheries Service, Southwest Region.
- Stillwater Sciences. 2010. Mad River watershed assessment. Final report. Prepared in association with Redwood Community Action Agency, and Natural Resources Management Corp, Eureka, California.

Information in this section is based on these reports; this section also includes comments and responses on those reports from CDFG and NMFS.

In comments on this document's Notice of Preparation, the North Coast Regional Water Quality Control Board recommended that geomorphic and hydrologic data from the years 2004 to 2007 also be included (Appendix C). With the publishing of Lehre et al. (2009), this comment has been addressed.

Concept of Sustained Yield Extraction

Sustained yield extraction is a concept that is certainly accepted by CHERT scientists, appears acceptable to NMFS scientists based on issuance of their July 2010 Biological Opinion, but is not readily accepted by CDFG scientists based on their 2009 Draft Supplemental PEIR comments. The concept requires that one accept that if instream gravel extraction occurs at a rate less than the river's ability to recruit new gravel, and if extraction occurs in ways that consider habitat maintenance and restoration, then effects based on morphological changes will be less than significant. In comments on the January 2009 Draft SPEIR and during meetings held to discuss agency comments, all agreed that definitions of mean annual recruitment (MAR) and sustained yield extraction were critical to this adaptive management program. Definitions in the literature vary, therefore all agreed that MAR and sustained yield extraction definitions should be specific to the lower Mad River. However, based on the July 2010 Biological Opinion, NMFS staff does not use "mean annual recruitment" any longer; the phrase appears only once in the BO's 169 pages. Instead, they are using an "annual recruitment estimate" that is calculated by NMFS' Fractional Extraction Volume (FEV) method.

Differences between MAR and FEV may be important to the volumes of extractable gravel, but are not as critical to this PEIR's analyses of significant impacts (**Error! Reference source not found.**).

Table Error! No text of specified style in document.**-7. Sustainable yield concept is supported by both MAR and FEV**

	Mean Annual Recruitment (MAR)	**Fractional Extraction Volume (FEV)**
Definition	MAR is the average annual supply of bed material load delivered to a river reach by high flows.	FEV is the extraction volume based on a fraction of the recruitment.
Length of record that is the basis for the estimate	MAR may change through time, but we can measure that change only on decades-long time scales as the river experiences alternating periods of high and low recruitment due to large catastrophic floods, and/or high and low erosion and sediment loading rates, in the contributing watershed upstream.	FEV is estimated each year on data collected during the single year.
Allows "sustained yield" concept	Yes, the MAR concept allows quantification of an extractable volume; the volume is always less than the MAR	Yes, extraction can be sustainable "if the annual extractions had varied with the annual recruitment level"
How estimated	Various methodologies and studies (**Error! Reference source not found.**)	A spreadsheet calculator developed by NMFS (2010)
Source	2009 Draft Supplemental PEIR	July 2010 Biological Opinion

MAR is the average annual supply of bed material load delivered to a river reach by high flows. The bed material load is transported by river flows and includes the coarser sediment sizes (sand and gravel) that are deposited in the form of gravel bars and flood terraces. These are the deposits that may be extracted from the river during "instream mining," to serve commercial, municipal, and agricultural needs. MAR may change through time, but we can measure that change only on decadal, not annual, time scales as the river experiences alternating periods of high and low recruitment due large catastrophic floods and/or high and low erosion and sediment loading rates, in the contributing watershed upstream.

The MAR concept allows us to quantify a "safe" volume of extractable sand and gravel for a reach, termed "sustained yield". The sustained yield volume is:

- Almost always less than MAR; it can only be a substantial fraction of MAR in reaches with excess bed material.
- Confirmed by topographic data that indicate aggradation within or downstream of the subject reach. If this is occurring, it is safe to assume recent mining volumes were not excessive. If instead degradation is noted, recent mining volumes may have been too high and should be reduced.
- Gradually refined through the adaptive management process that is supported by river monitoring that quantifies responses to floods, mining, and other influences on river geomorphic form and habitat.
- Extracted using techniques that are site-specifically designed to minimize and avoid negative impacts to resources, and in some cases may benefit those resources

Under limited circumstances and for limited time periods, sustained yield extraction can be higher than MAR. These circumstances are limited to river reaches with excessive coarse sediment deposits; when allowed, extra care is required in applying extraction methods that avoid short-term habitat damage. Further, rigorous monitoring must be performed: 1) to ensure impacts to infrastructure and habitat are minimized, and 2) to determine when sediment transport and deposition regain a balance, at which time mining must be reduced to minimize risks to habitat and infrastructure.

Four studies have estimated the MAR of the lower Mad River. The MAR estimates vary due to differences in data sets and methods used to analyze those data (**Error! Reference source not found.**); all are approximations due to necessary assumptions, the completeness of topographic data, and the spatial and temporal variability in river process and form. Nonetheless, of the four studies summarized below, three are considered to be in fairly close agreement.

Table Error! No text of specified style in document.**-8. Estimates of Mean Annual Recruitment on the lower Mad River**

Study authors, year	Study funding source(s)	Data sources and time periods	Estimated MAR (yd^3/ year)
Lehre, A.K. 1993	Gravel operators through CHERT program	Various sources[a] of cross sections from 1929 to 1992.	150,000 with a 200,00 "high estimate"
Kondolf, G.M. and E. Lutrick. 2001	Eureka Ready Mix	Corps' cross section surveys in 1970 and 1999	270,000
Knuuti, K. and D. McComas. 2003	US Army Corps of Engineers	Corps' cross section surveys in 1970 and 2000	114,000 (only includes the reach from Hwy 299 to Mad River Fish Hatchery)

Study authors, year	Study funding source(s)	Data sources and time periods	Estimated MAR (yd^3/ year)
Lehre, A. et al. 2005	Gravel operators through CHERT program	Operators' cross sections from 1993 to 2003	135,000 to 155,000
Lehre, A. et al. 2009	Gravel operators through CHERT program	Operators' cross sections from 1993 to 2007	MAR estimate not updated

[a] Cross section sources were Caltrans, Humboldt County, and the Humboldt Bay Municipal Water District.

The MAR estimate of 114,000 yd^3/ year from Knuuti and McComas (2003) only included the reach from the Highway 299 bridge upstream to the Mad River Fish Hatchery, omitting the downstream reach. In establishing the 175,000 yd^3/ year cap in 2004, the Corps upscaled Knuuti and McComas' estimate to account for the entire mining reach.

In the 23 July 2009 meeting between CHERT and NMFS, NMFS stated their concern that estimates of MAR were "consistently going down" which may indicate a "cumulative deficit." However, differences in methodology and assumptions are the primary reasons why the MAR estimates vary. Regarding the MAR estimates' variance, CHERT (2005) concluded:

> "This analysis suggests that, under current conditions, overall "zero effect" extraction on the Mad River is on the order of 85,000 yd^3/yr for the upstream reach and 50,000 – 70,000 yd^3/yr for the downstream reach, or a total of 135,000 – 155,000 yd^3/yr for the entire river. Given the uncertainties in this approach, the current average extraction of 175,000 yd^3/yr is not unreasonable, but certainly appears to be an upper limit. The 270,000 yd^3/yr that Kondolf and Lutrick (2001) suggest might be extracted appears much too high, while the 112,000 yd^3/yr suggested by Knuuti and McComas (2003) is probably unnecessarily low."

In the 23 July 2009 meeting with NMFS and CHERT, CHERT reaffirmed its estimate of MAR as between 100,000 to 150,000 yd^3/yr, with 135,000 yd^3/yr as their best estimate. Again, they cautioned that large error bars surround these estimates. NMFS scientists restated their need for assurance that extraction is at appropriate levels, on an annual basis; assurance could take the form of additions/revisions to the CHERT program that allow additional information or photos to be available, or additional review by NMFS. CHERT scientists stated that MAR change is decadal, not annual, and that managing gravel extraction with an annually varying MAR has little scientific basis. Since then, NMFS scientists have developed their method of estimating FEV, using an extraction upper limit of 175,000 yd^3/yr during "high recruitment years" and a lower limit of 72,000 yd^3/yr during "low recruitment years."

Channel Aggradation and Degradation

In the 1994 PEIR, many impacts were listed as being potentially caused by gravel extraction. Geomorphic impacts listed included increases in bed degradation (lowering), bank destabilization, and bank erosion. Many of the biological impacts were closely related to geomorphic ones, and included creation of shallow channels that impede fish migration, and creation of topographic barriers at tributary mouths that would also impede fish migration. The benefits of trenching in aggraded reaches versus its potential detrimental effects in degraded reaches were also discussed in the 1994 PEIR.

Channel aggradation and degradation are indicated, but not conclusively defined, by changes in a cross section's mean elevation, its thalweg elevation, and its channel width. In the cross section analyses evaluated by CHERT in 2005, 70 cross section locations at 11 bars were analyzed. Most cross sections were surveyed annually between 1992 and 2003, but some annual surveys were missing in the data sets (Lehre et al. 2005). This analysis was updated in 2009 with annual surveys conducted in 2004 to 2007. In the 2009 update, some cross sections had to be re-adjusted and "patched" so that surveys from 1993 to 2007 could be compared (Lehre et al. 2009).

At each cross section, a reference elevation was established by overlaying each year's cross section on the same axes, and then selecting an elevation that is above "all significant yearly flow or man-caused changes in bed, bars, and banks" as an unchanging reference elevation for quantifying changes (Lehre et al. 2005). The width of the cross section at the reference elevation was determined to be the cross section width. Uncertainties in width measurements were greatest where banks are gently sloping because a small change in elevation could cause a large change in width.

The mean cross section elevation is the average of all uniformly closely spaced elevation points on a cross section, between the cross section end points that are defined by the reference elevation. The thalweg elevation is the minimum elevation in the channel portion of the cross section. Channel confinement is indicated, but not precisely defined, by the difference between the cross section's mean elevation and its thalweg elevation; the greater the difference, the more the channel is confined. This general rule of thumb breaks down when the thalweg and mean elevations do not "track" or move in concert, due to channel in-filling or bar surface elevation decreasing, in which case the channel confinement metric can decrease.

On the lower Mad River between 1993 and 2003, mean elevation and thalweg elevation generally do move in concert or "track". Differences between upstream and downstream cross sections and bars were evident (Lehre et al. 2005); the 2009 update report "reaffirms our observations in the 2005 Report" (Lehre et al. 2009). Guynup Bar is representative of the upstream bars and the Miller-Almquist Bar is representative of the downstream bars (**Figure** Error! No text of specified style in document.**-1** and **Figure** Error! No text of specified style in document.**-2**). In the downstream bars, mean and thalweg elevations were generally increasing over time, as represented by cross section XS5 at the Miller-Almquist Bar (**Figure** Error! No text of specified style in document.**-2**). In the upstream bars, mean and thalweg elevations were generally decreasing over time, as represented by cross section XS5 at Guynup Bar (**Figure** Error! No text of specified style in document.**-1**). Channel confinement was not consistently increasing or decreasing, as measured by the differences in mean and thalweg elevations. Since 2003, the upstream reach's channel "has continued to enlarge but the rate of enlargement appears to have declined.

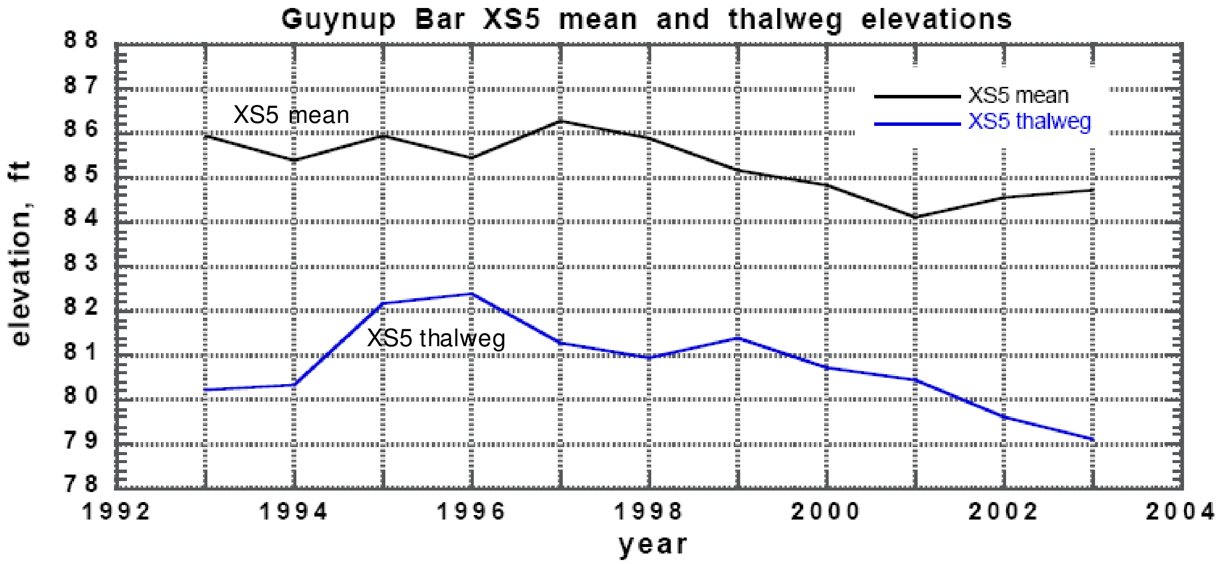


Figure Error! No text of specified style in document.**-1. Mean and thalweg elevations over time indicate a general elevation decrease in upstream bars (Lehre et al. 2005).**

The differences between the mean and thalweg elevations indicate the degree of channel confinement; the greater the distance, the greater the channel confinement.

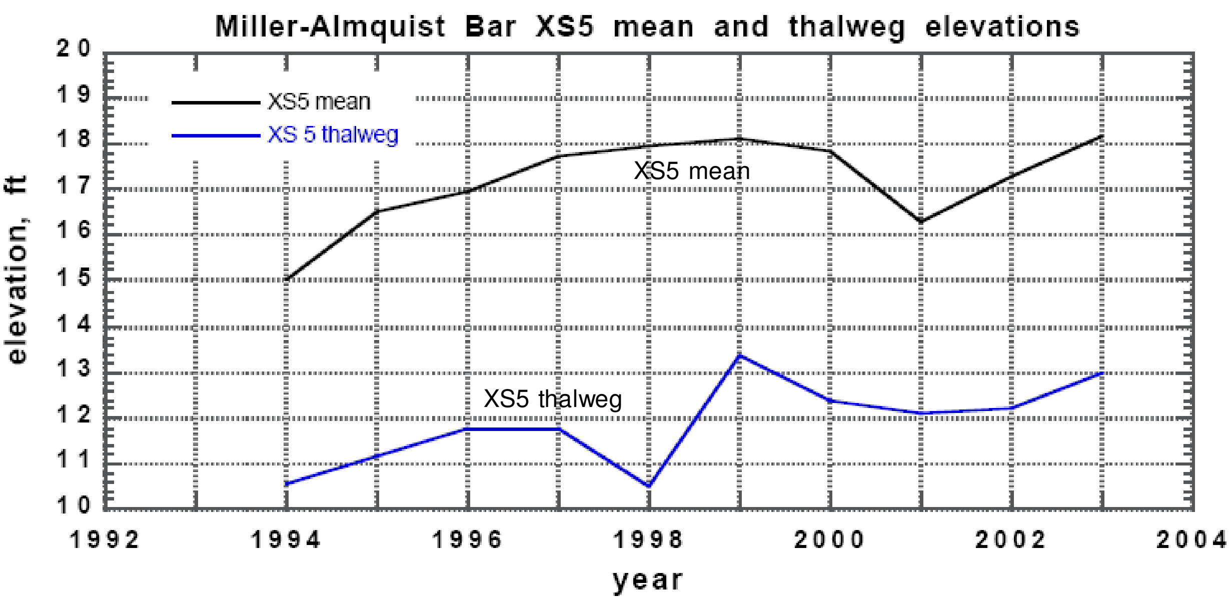


Figure Error! No text of specified style in document.**-2. Mean and thalweg elevations over time indicate a general elevation increase in downstream bars (Lehre et al. 2005).**

On the scale of individual bars, longitudinal profile changes are similar to the trends observed in temporal and spatial changes in the river as a whole. At the upstream bars, mean elevations have been generally decreasing spatially and temporally since 1997. At downstream bars, mean elevations have been increasing spatially and temporally since 1993. A representative longitudinal profile at an upstream bar (Blue Lake Bar) is presented in

Figure Error! No text of specified style in document.**-3**, and another for three downstream bars (Johnson-Spini, Miller-Almquist, and O'Neill bars) in Figure Error! No text of specified style in document.**-4**.

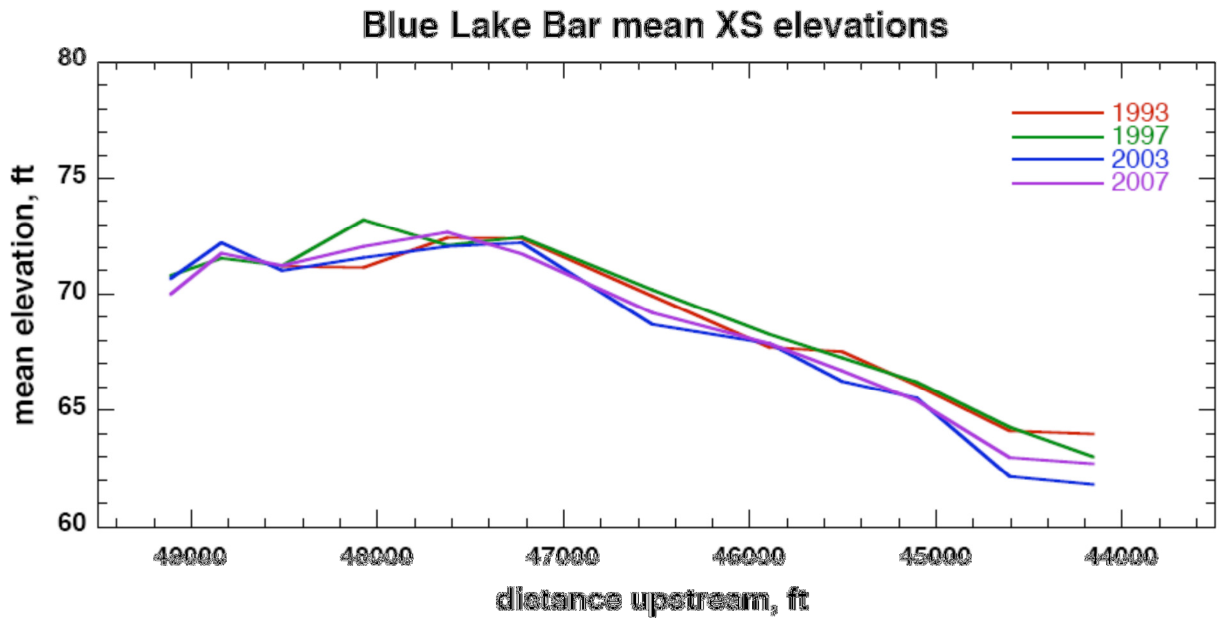


Figure Error! No text of specified style in document.**-3. A longitudinal profile of mean cross section elevations at Blue Lake Bar represents upstream bars on the lower Mad River (Lehre et al. 2009). Mean elevations are generally decreasing at upstream bars.**

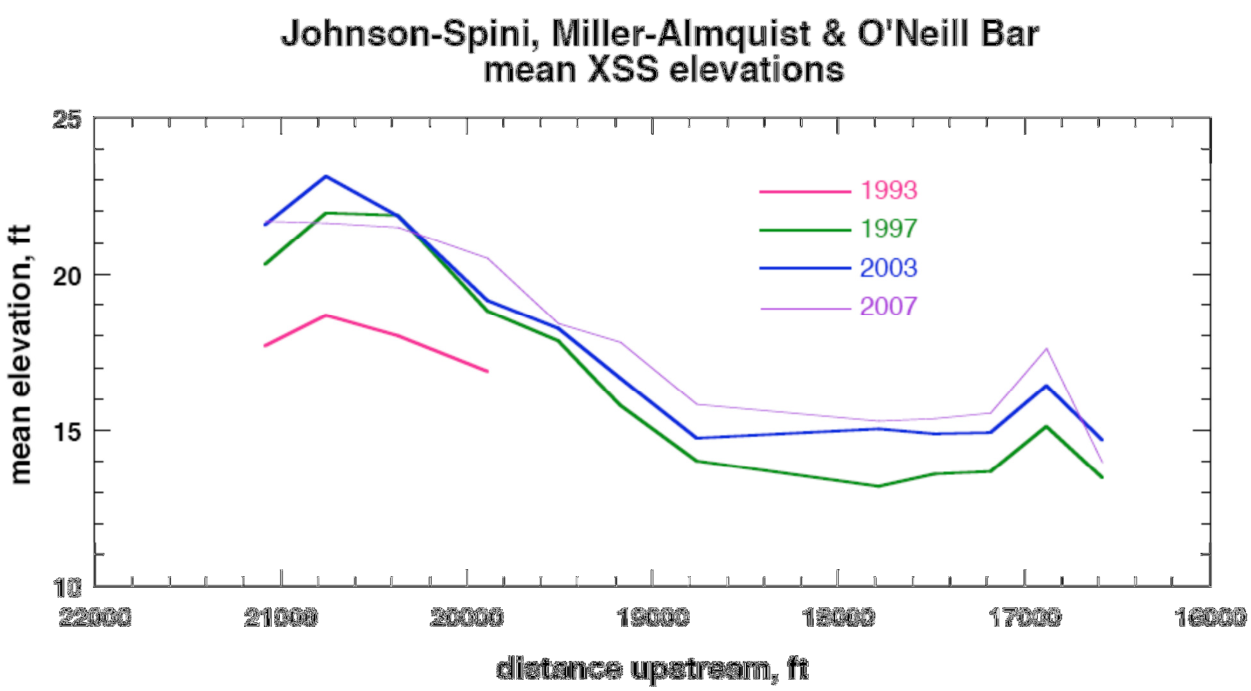


Figure Error! No text of specified style in document.**-4. A longitudinal profile of mean cross section elevations at Johnson-Spini, Miller-Almquist, and O'Neill bars, represents downstream bars on the lower Mad River (Lehre et al. 2009). Mean elevations are generally increasing at downstream bars.**

In their 2009 cross section analysis, Lehre et al. (2009) summarize:

> "In summary, the large unconfined upstream sites have been major losers of stored sediment, largely through bank erosion rather than downcutting, while the confined or semi-confined downstream sites have undergone significant aggradation. The two do not balance however: upstream erosion is about three times the rate of downstream deposition, and from 1993-2007 the Mad experienced a net loss of about 920,000 cu yd. of bed and bank material, or 66,000 cu. yd./year."
>
> "For the period 1993-1997, …a net aggradation (negative volume change) of around 190,000 cu yd [was indicated], despite more bed material being extracted than was resupplied. This alone suggests that our estimates of sediment input may be in error. But for 1997-2003 and 2004-2007 the volume change is surprisingly similar to the difference between volume extracted and volume input from upstream. This may be fortuitous, an artifact of compensating error in the sediment transport and volume change estimates. Furthermore, it may be erroneous to include all of the sand load in the recruitment estimate. But, taken at face value, it suggests that relatively little sediment is available to be transported downstream below the mining reach, and that extraction continues to outpace replenishment, chiefly at the upstream sites."

Channel Stability, Bank Erosion, and Channel Width

As a metric for channel stability, active channel widths and active channel surface areas were defined and measured, using the cross sections and aerial photographs provided by the gravel operators, from 1992 to 2007 (Lehre et al. 2005, 2009). The active channel was defined as that portion of the river corridor with frequent sediment deposition or scour; "frequent" means "at least once every several years" (Lehre et al. 2005). Active channel widths and surface areas were also determined to indicate whether the active channel expanded or contracted over time and in response to floods and/or mining. Bank erosion was also estimated using the cross sections and aerial photographs, but for a shorter time period (1998 to 2007) in the recent CHERT analysis (Lehre et al. 2005, 2009) since earlier bank erosion was evaluated in the 1997 post-extraction report.

Large floods often widen the active channel where banks are composed of alluvium, while smaller flows allow the channel width to shrink back to pre-flood conditions. During large floods, riparian vegetation can be scoured, allowing the channel width to expand. During low flows, riparian vegetation can establish, which would tend to shrink the active channel. Including six active channel measurements during the years 1954, 1962, 1966, 1974, 1981, 1988, and the years from 1992 to 2007, CHERT scientists noted that a "relationship between active channel area and peak discharge is suggested" (Lehre et al. 2005).

Annual bank erosion volumes were estimated and associated with annual peak flows, from 1993 to 2007 (**Error! Reference source not found.**). In general, similar to active channel area, bank erosion is related to peak discharge. An exception is evident in 1996, when a relatively large flood occurred yet bank erosion was limited compared to that occurring in 1995, 1997, and 2003. One explanation could be that "the previous year (1995) was the first large flood for several years, causing a large volume of bank erosion. Perhaps the flood had 'reset' the channel, removing most of the unstable banks, leaving little remaining for the 1996 flood the very next year" (Lehre et al. 2005).

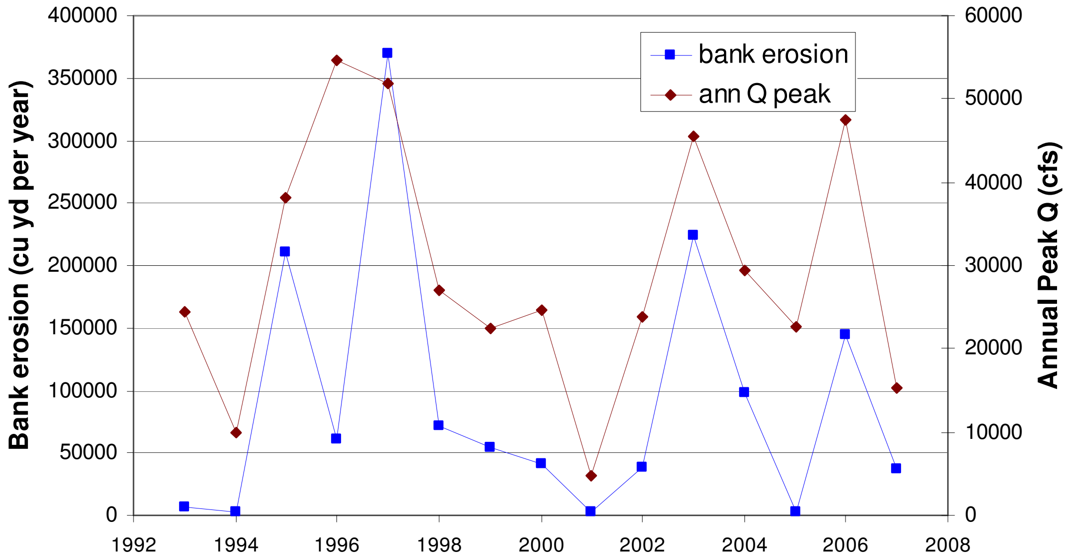


Figure Error! No text of specified style in document.**-5. Bank erosion is generally related to annual peak flows on the lower Mad River during 1993 to 2007 (adapted from Lehre et al. 2009). An exception occurred during 1996 when the peak flow was high but bank erosion was relatively low.**

Channel width, as defined by the distance from one side of a cross section to the other at the reference elevation, is "strongly affected by geomorphic setting" (Lehre et al. 2005). At the upstream bars, cross sections are wide and large width increases are common; Christie Bar is representative of this relationship (**Figure** Error! No text of specified style in document.**-6**). At the downstream bars, where the channel is bounded by erosion-resistant banks, channel width remained relatively constant (**Figure** Error! No text of specified style in document.**-7**).

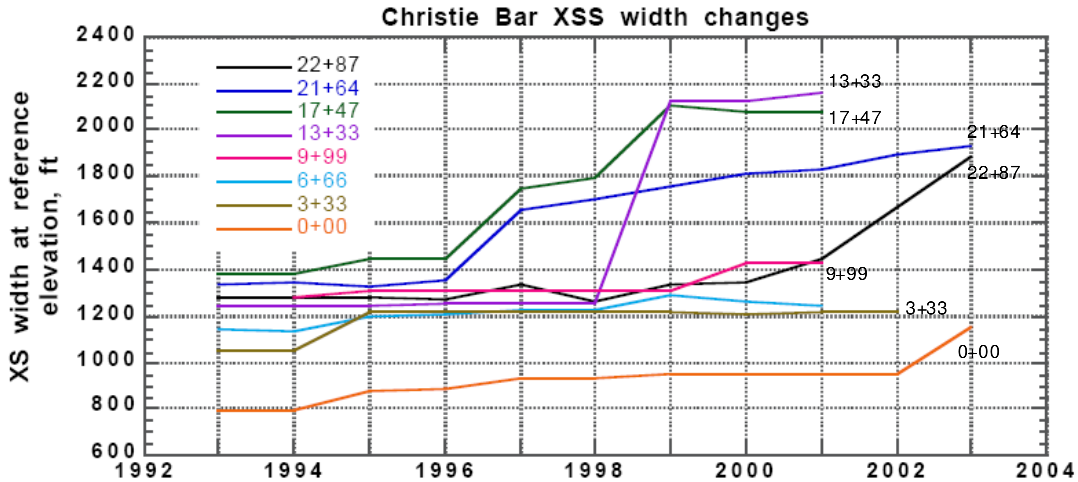


Figure Error! No text of specified style in document.**-6. Channel width can increase dramatically at the unconfined upstream bars; Christie Bar is representative of this potential change in width; cross section 13+33 exemplifies a dramatic channel width increase from 1998 to 1999 (Lehre et al. 2005).**

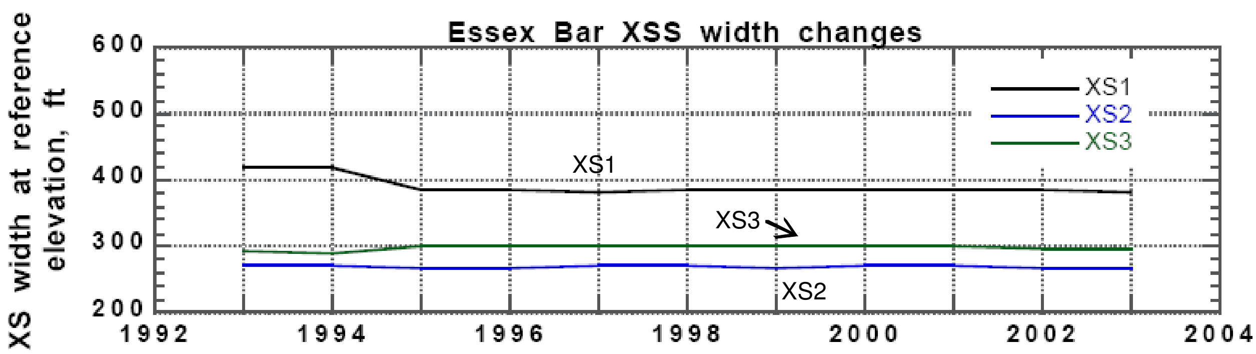


Figure Error! No text of specified style in document.**-7. Channel width remains approximately constant at the downstream bars, where bars are constrained by resistant banks; Essex Bar is representative of this approximately constant width (Lehre et al. 2005).**

By averaging cross section widths by site, differences between the upstream (above the HBMWD reach) and downstream reaches becomes apparent (Figure Error! No text of specified style in document.**-8**). At the upstream sites (Guynup to Johnson sites), width change increased from the period 1993-1997, 1997-2003 to 2003-2007. At the downstream sites (HBMWD to O'Neill bars), channel width neither widens nor narrows from 1993-2007 (Figure Error! No text of specified style in document.**-8**) because of relatively non-erodable banks.

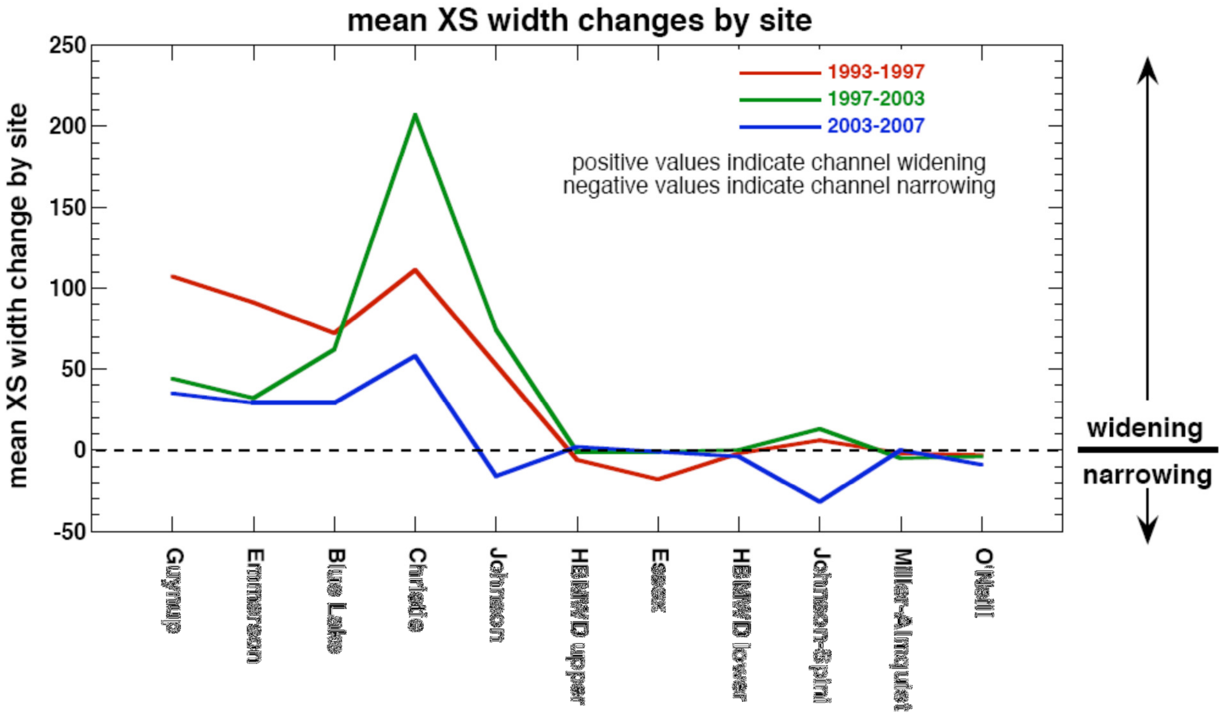


Figure Error! No text of specified style in document.**-8. Upstream sites from Johnson to Guynup bars exhibit channel widening, whereas the width of downstream sites, from HBMWD to O'Neill bars, remain unchanged (Lehre et al. 2009).**

Channel enlargement is a metric that NMFS scientists have focused on as an indicator of extraction effects (**Error! Reference source not found.**). "The figure (**Error! Reference source not found.**) shows overall enlargement in the upper extraction reach, which is the area above Annie & Mary Railroad Bridge (A&MRR Bridge), during both periods. The figure indicates that the greatest enlargement has occurred in areas of the greatest extraction. The figure also shows that there has been little change in areas where there has been no extraction between sites" (NMFS 2010).

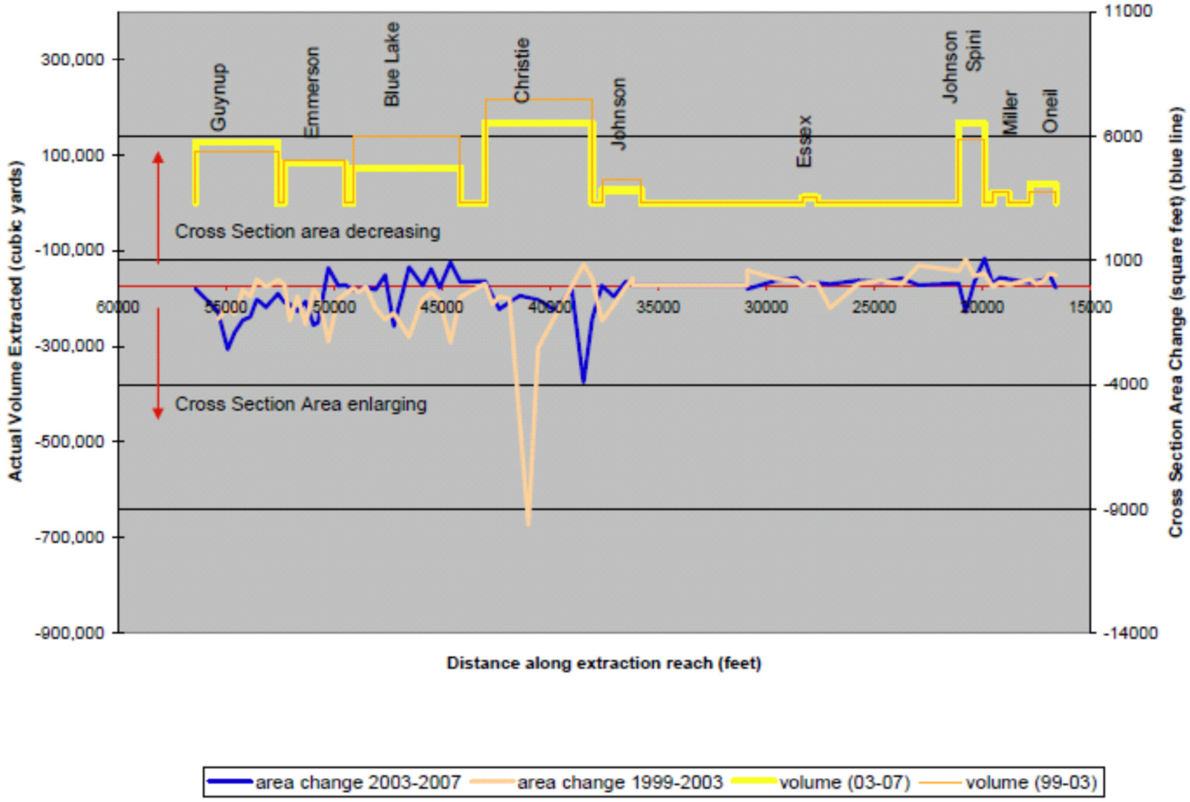


Figure 9 Changes in Cross Sectional Area in two 5-year periods, 1999-2003 and 2003-2007.

Figure Error! No text of specified style in document.**-9. Cross section area change and volume extracted (NMFS 2010)**

Confinement trends through time, as measured by the difference between mean and thalweg elevations, were suggested but not obvious. However, mean confinement trends through space, that is, from upstream bars to downstream bars, are more readily seen (**Error! Reference source not found.**). The time periods 1993-1997 and 1997-2003 were selected because large peak flows in 1996 and 1997 "reset" many of the geomorphic features of the lower Mad River. Confinement trends for 2003 to 2007 have also been plotted (**Error! Reference source not found.**) and indicate decreasing confinement at the downstream sites such as Johnson-Spini to O'Neill sites.

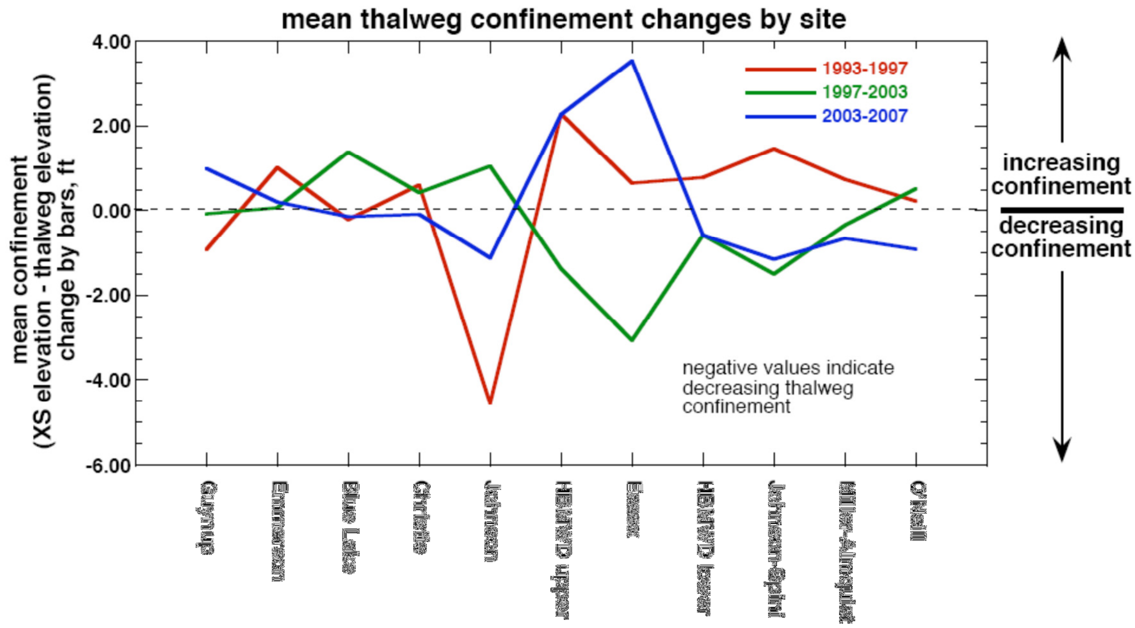


Figure Error! No text of specified style in document.**-10. At the downstream bars (from O'Neill to Johnson bars), mean confinement decreased from the period 1993–1997 to 1997-2007 (Lehre et al. 2009).**

At the upstream bars (from Johnson to Guynup bars), mean confinement increased during the same periods.

Lehre et al. (2009) show a substantial loss of gravel storage in the upper reach within the past decade or so, primarily through the process of channel widening. In comments on the January 2009 Draft SPEIR, NMFS suggested that loss of storage and channel widening could be impacts due to gravel extraction. Although both are occurring simultaneously, a causal link between the channel widening and sustained yield extraction has not been documented; in fact, recent active channel areas are far less than historical levels following the large floods of the 1950s and 1960s, when mining volumes were relatively low (see Figure 5 in Lehre et al. 2005).

In comments on the January 2009 Draft SPEIR, NMFS also suggested examining an unmined bar on the Mad River to better understand mining effects. Leavey Bar, located between Blue Lake Bar and Christie Bar, is the only bar feature not mined within the upstream reach near Blue Lake. Although recommended by NMFS, using this bar as a "reference site" is problematic due to the low density of cross sections and the probable influences of mining upstream and downstream. However, to assist NMFS in evaluating the value of a reference reach, CHERT closely examined this bar using the cross section data and plots, as well as air photos spanning the period. Cross section plots for Leavey Bar are shown below in upstream-to-downstream order for survey years spanning 1993 to 2007 (**Figure** Error! No text of specified style in document.**-11** and **Figure** Error! No text of specified style in document.**-12**). Similar cross section plots were prepared for Christie Bar (**Figure** Error! No text of specified style in document.**-13** and **Figure** Error! No text of specified style in document.**-14**)

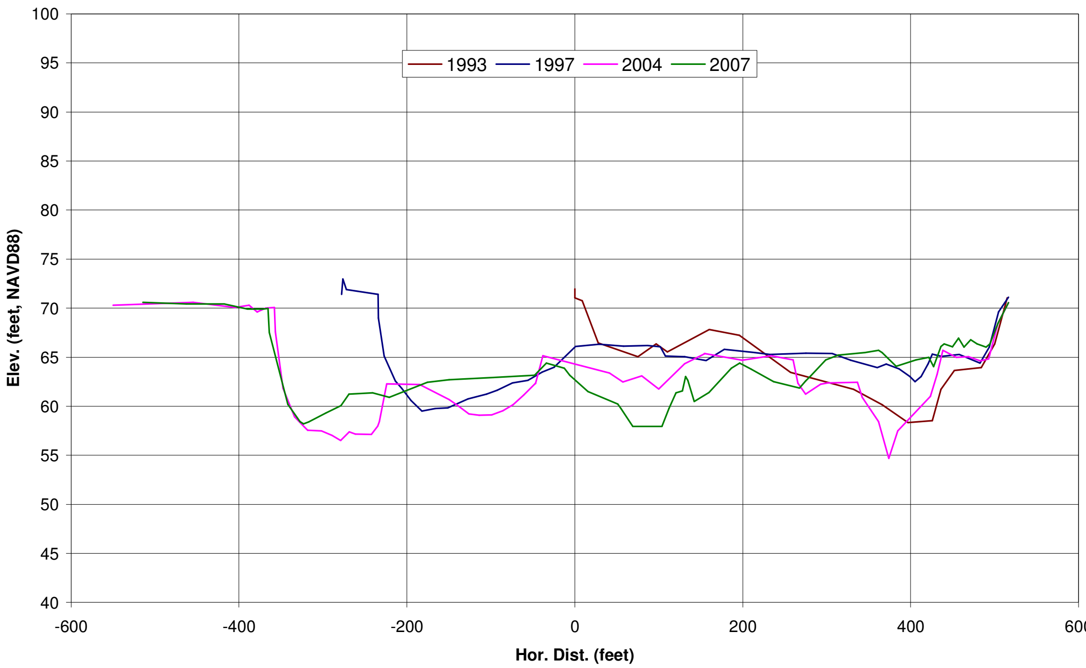


Figure Error! No text of specified style in document.**-11. Blue Lake/Leavey Bar (Granite XS BL 38+00) is a bar that NMFS considers to be an unmined bar "reference site" (Klein 2009). Channel widening is evident; air photos indicate that scour from high flows occurred in locations on the cross section with little apparent downcutting, thereby increasing the width of the active channel.**

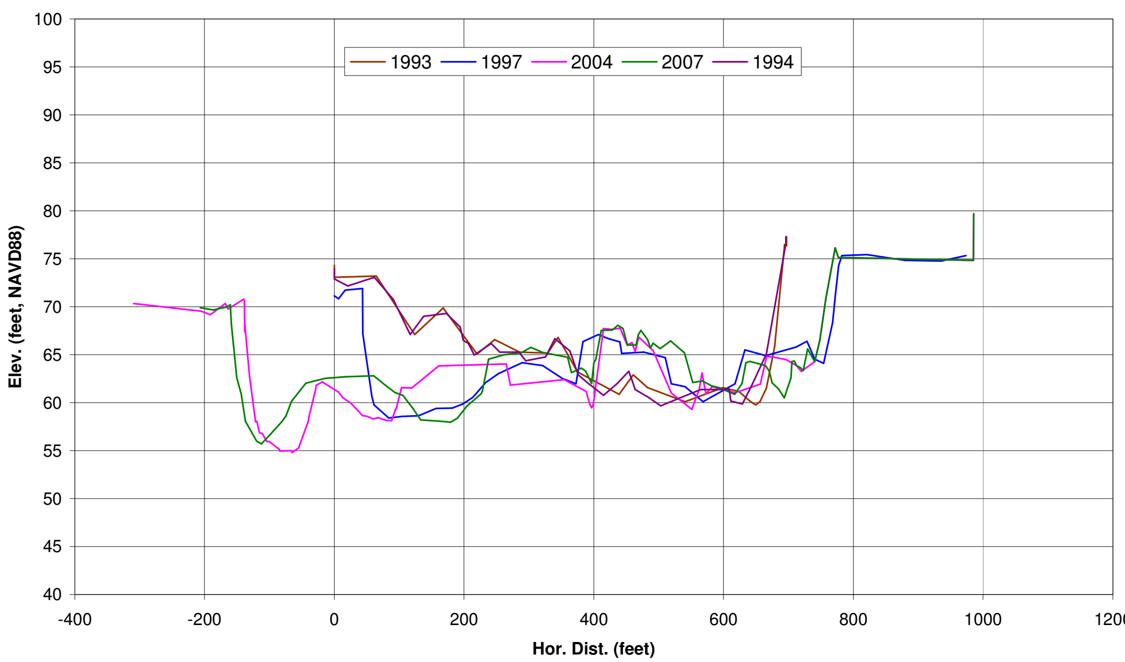


Figure Error! No text of specified style in document.**-12. Blue Lake/Leavey Bar, Granite XS BL 42+00 (Klein 2009). Channel widening is evident; air photos indicate that scour from**

high flows occurred in locations on the cross section with little apparent downcutting, thereby increasing the width of the active channel.

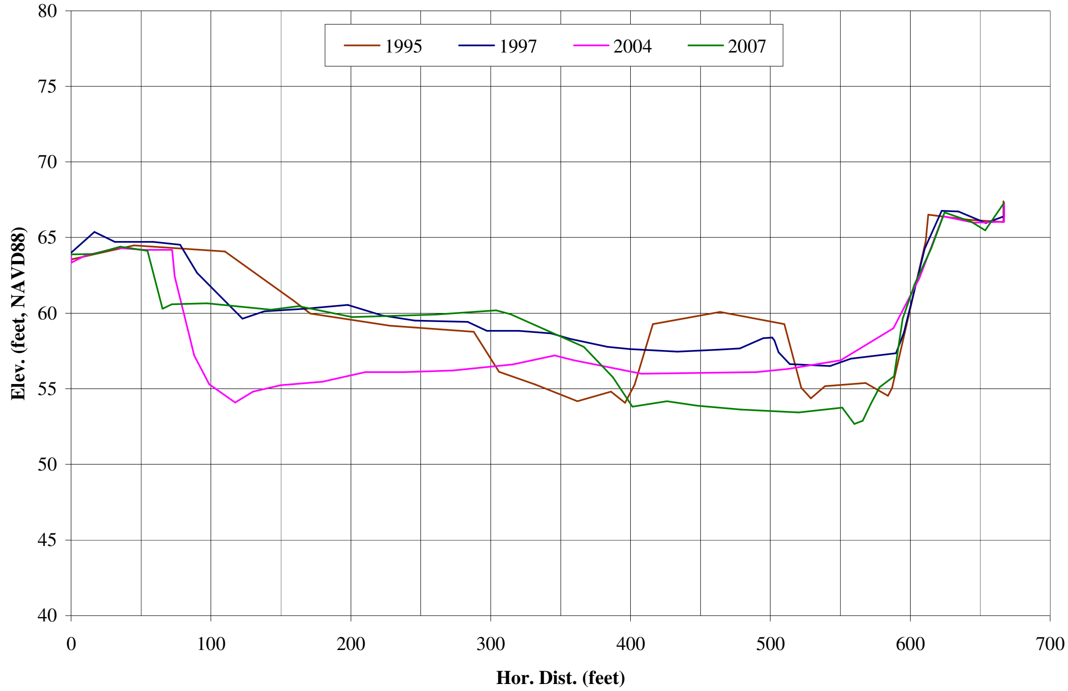


Figure Error! No text of specified style in document.**-13. Christie Bar XS 1 (formerly XS 5) (Klein 2009). Channel widening is less than at Leavey Bar, which NMFS considered to be an unmined "reference site".**

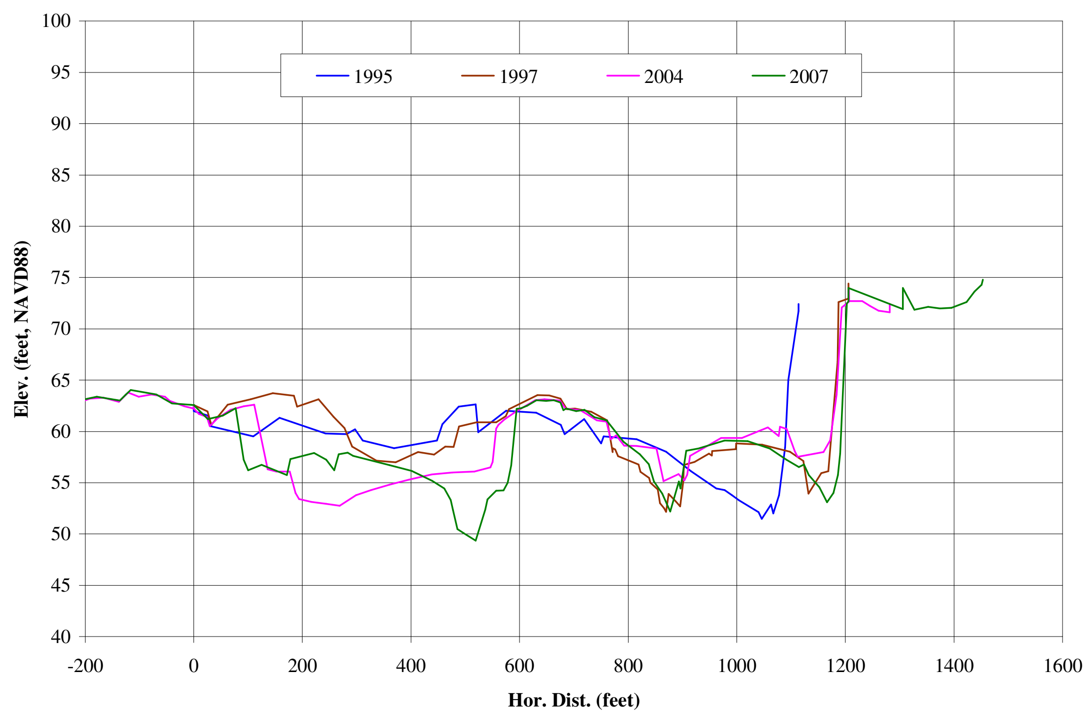


Figure Error! No text of specified style in document.**-14. Christie Bar XS 2 (formerly R-3) downstream of Leavey Bar (Klein 2009). Channel widening is less than at Leavey Bar, which NMFS considered to be a "reference site."**

Analyses indicate that channel widening and attendant losses in gravel storage occurred at both the "reference" Leavey and mined Christie bars. Although bank erosion is evident on each cross section, air photos indicate that scour from high flows occurred in locations on the cross section with little apparent downcutting, thereby increasing the width of the active channel. To see how channel width and area changed over time for Leavey and Christie bars, cross section active channel widths and total active channel surface area were graphed (**Figure** Error! No text of specified style in document.**-15**). Active channel area expanded at Leavey Bar episodically throughout the 1993-2007 period. Width expansion would likely have been greater if not for a levee along the north bank near the City of Blue Lake wastewater treatment plant (extending from XS 42+00 to CH1, a distance of about 2000 feet); the river was clearly tending to migrate northward at this location. Width and area estimates, shown on **Figure** Error! No text of specified style in document.**-15**, show the cross sections more than doubled their active channel widths, while area increased by about 35 acres. The percent increases are at least as large as those for the upper reach as a whole (see Lehre et al. 2009) and indicate that channel widening and attendant losses in gravel storage occurred at both mined and unmined bars.

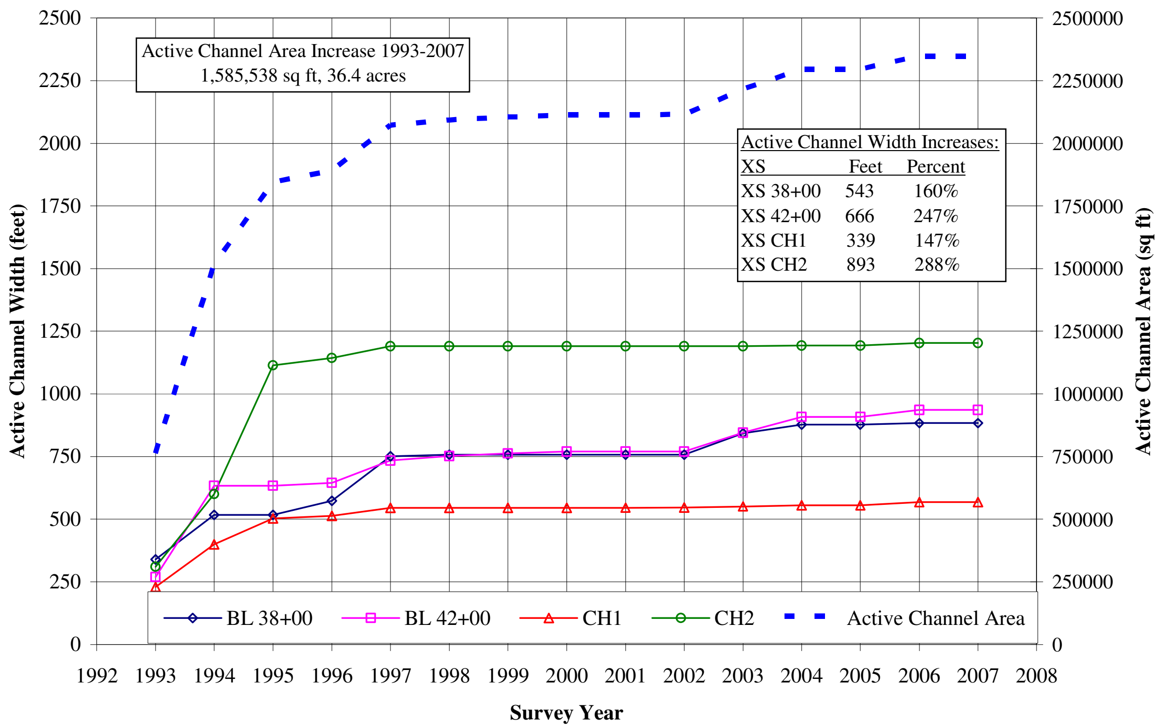


Figure Error! No text of specified style in document.**-15. Active channel widths and areas at Leavey and Christie bars, Mad River (Klein 2009). Channel widening and attendant losses in gravel storage occurred at both mined and unmined bars.**

The above analysis indicates that if Leavey Bar is a representative reference site, then one interpretation is that gravel extraction is not the cause of widening and storage losses because both occur at mined and unmined bars. Although we cannot state this definitively, the similar geomorphic history of this single unmined bar with mined bars tends to support that gravel mining did not cause channel widening and, therefore, storage losses.

DOWNSTREAM HYDROLOGY

“Hydrology” covers precipitation data and patterns, surface runoff patterns, flow magnitude and timing, flood frequency analyses, water diversions and water balances, and groundwater flow. The CHERT adaptive management program does not affect precipitation, flow magnitude and timing, flood frequencies, or water diversions. However, the program could affect groundwater in terms of influencing aggradation or degradation; aggradation or degradation of the channel bed could affect depth to groundwater in areas adjacent to the river.

The effects of aggradation or degradation on groundwater depth can not be precisely defined, but for the lower Mad River, aggradation could cause a decrease in depth to groundwater if groundwater elevations rise. This is assumed in the 1994 PEIR, which states “Other factors being equal, aggradation raises the water table and would allow an expansion of phreatophytic vegetation, riparian habitat, and wetland habitat…” (HCPBD 1994). The 1994 PEIR also assumes that channel degradation “lifts river terraces above the river, lowers the water table and produces a corresponding migration of phreatophytic vegetation, riparian habitat, and wetland habitat towards the river thalweg” (HCPBD 1994).

CHANGES IN GEOMORPHOLOGIC METRICS

In CHERT’s 2005 report, an analysis of changes in river geomorphologic metrics was presented. Because the CHERT adaptive management program determines the volume of extraction, by extension we may be able to describe the CHERT adaptive management program’s impact on river geomorphology.

The CHERT adaptive management program has limited gravel extraction volume, compared to pre-1992 extraction volumes (see Figures 2-6 and 2-7, Section 2.1.4). Current extraction rates are much less than historical extraction volumes (**Error! Reference source not found.**). Further, since 1993, most of the extraction occurs at the upstream sites (**Error! Reference source not found.**).

Table Error! No text of specified style in document.**-9. Gravel extraction volumes on the lower Mad River**

Period	Number of years in period	Estimated average annual extraction (yd^3 per year)	Source
1952-1991	41	358,000	HCPBD 1994
1960-1992	33	425,000	

1982-1991	10	286,000	
1993-2007	11	164,000	CHERT records

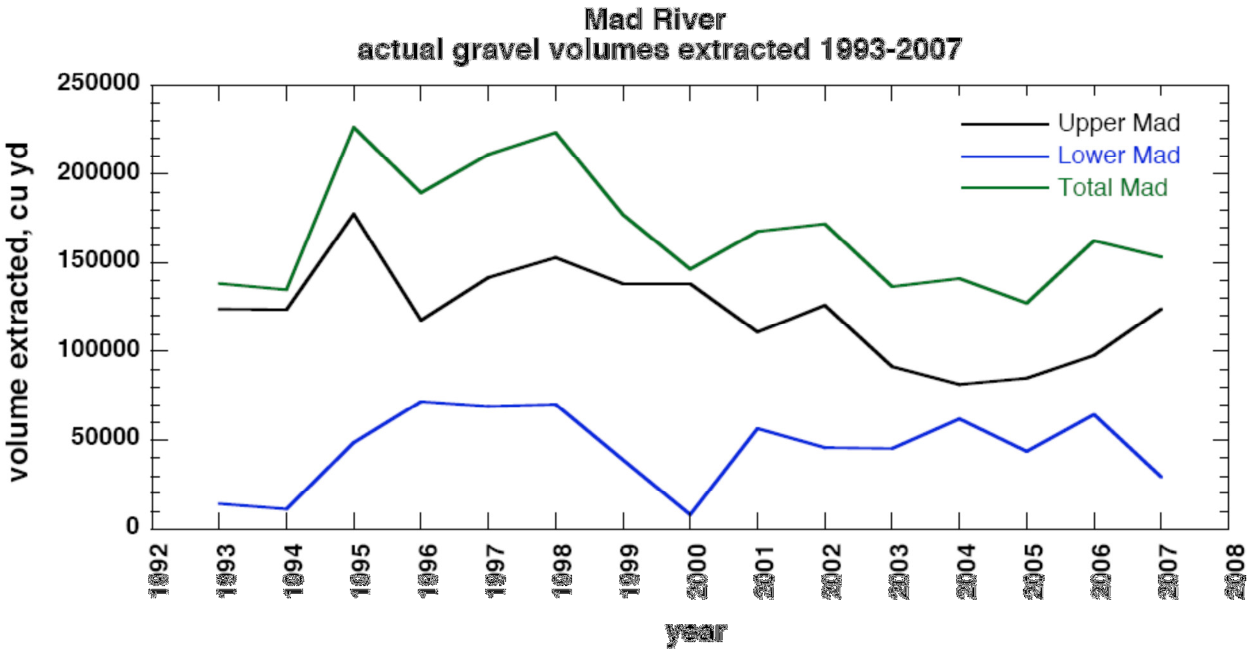


Figure Error! No text of specified style in document.**-16. Most gravel extraction occurs at the upstream sites, which include Guynup, Emmerson, Blue Lake, Christie and Johnson bars (Lehre et al. 2009). The lower sites include Essex, Johnson-Spini, Miller-Almquist, and O'Neill bars.**

In the 2005 and 2009 cross section analyses and update (Lehre et al. 2005, 2009), graphical and statistical analyses were attempted to correlate gravel volume and the following channel metrics:

- Mean elevation
- Thalweg elevation
- Confinement
- Cross section width
- Cross section area
- Cross section volume

Lehre et al. (2009) state that in their 2005 cross section analysis "…we suggest that the 1997-2003 regressions might be useful in predicting channel response to future extraction at the upstream sites, and furthermore used them to estimate the amount of annual extraction that might result in no channel changes. We tested this hypothesis using the 2004-2007 data, and it failed."

SITE SPECIFIC EFFECTS

Prior to the CHERT adaptive management program, skim elevation surfaces were lower and skim widths were wider. Through recommendations by the CHERT team, approvals by regulatory agencies, and adherence to pre-extraction plans by the operators, site specific adverse effects have been minimized. In addition to raising minimum skim floor elevations, the program has developed alternative extraction methods, such as constructing alcoves and wetland pits. (The constructed alcoves and pits increased riparian and aquatic habitat for targeted species such as fish and red-legged frogs, but now may also be utilized by the invasive and non-native bullfrog; see Section 4.3.2). Post-extraction inspections allow CHERT members to observe and evaluate the impacts of alternative extraction designs under various site conditions; additionally they serve to determine whether or not operators have extracted according to their plans and permits and to identify and correct any problems with drainage, etc., before winter high flows arrive.

Not all sites are suitable for wetland pits. Gravel pit wetlands have been constructed on Christie, Blue Lake, and Emmerson bars (see Section 4.2.2). The development and evolution of the gravel pit wetland on Christie bar, which was excavated in WY1993, has been photographed over time (Trush 2008a, see Appendix A). By WY1996, the wetland perimeter was densely colonized by vegetation such as cattails, rushes, and willows. This wetland area was neither scoured nor filled in the January 1997 flood, but by WY2000, the mainstem Mad River had started to migrate to the wetland pit. By WY2007, the wetland had been eroded away. Similar conditions occurred at the wetland pits excavated on Blue Lake and Emmerson bars; the pits "evolved into wetlands, and then naturally disappeared" (Trush 2008a).

Large woody debris is a valuable component of the aquatic habitat and lack of it is often severely limiting. When large woody debris is present at an extraction site, CHERT recommendations and the LOP requirements ensure that it is retained onsite. However, the public often harvests large wood for firewood, thereby reducing existing and future (as it moves episodically downstream) habitat. Operators have attempted to limit public access through controlling roads and posting signs, but this long-term local practice continues in spite of efforts to control it. Although CHERT would like to see the practice of gathering instream firewood eliminated, its regulation is beyond their scope.

APPENDIX E

Additional Air Quality Impacts Discussion

Air Basin, Climate and Meteorology
The project site is located within North Coast Air Basin (NCAB) which includes all of Humboldt, Del Norte, Trinity, and Mendocino Counties, as well as a portion of Sonoma County (Humboldt County 2007). The North Coast Unified Air Quality Management District (NCUAQMD) regulates air quality in the Humboldt, Del Norte and Trinity County portions of the NCAB, while Mendocino and Sonoma counties have separate air management districts (COE 2008).

Air Quality is affected by both the rate and location of pollutant emissions and by meteorological conditions that influence movement and dispersal of pollutants. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and air quality (Humboldt County 2007). In the NCAB, air quality is predominantly influenced by the climatic regimes of the Pacific. In summer, warm ground surfaces draw cool air in from the coast, creating frequent thick fogs along the coast and making northwesterly winds common. In winter, precipitation is high, winter time surface wind directions are highly variable, and weather is more affected by oceanic storm patterns (Humboldt County 2002). At the project site and greater Eureka Community Plan (ECP) area, average temperatures range from 50º degrees Fahrenheit in winter to 57º in summer, and average precipitation ranges from 1.0” in summer to 29.1” in winter (NOAA 2009).

As a result of the region’s topography and coastal air movements, inversion conditions are common in the NCAB (Humboldt County 2007). Inversions are created when warm air traps cool air near the ground surface and prevents vertical dispersion of air. Valleys, geographic basins, and coastal areas surrounded by higher elevations are the most common locations for inversions to occur. During the summer, inversions are less prominent, and vertical dispersion of the air is good. However, during the cooler months between late fall and early spring, inversions last longer and are more geographically extensive; vertical dispersion is poor, and pollution may be trapped near the ground for several concurrent days (Humboldt County 2007).

Ambient Air Quality - Criteria Pollutants
Air quality is a general term used to describe various aspects of the air to which plants and human populations are exposed on a regular basis. Air quality can be degraded by a variety of contaminants including: (1) criteria gas pollutants such as ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, hydrogen sulfide, and vinyl chloride; (2) criteria particulate matter such as respirable particulate matter (PM10) and fine particulate matter (PM2.5); and (3) toxic air contaminants (TACs) such as volatile organic compounds (VOCs), polycyclicaromatic hydrocarbons and metals. Ambient air quality standards and allowable limit levels for these pollutants are based on their predicated health effects and are set at both the state and federal levels. In most cases, federal and state standards are similar, except that some state standards are more restrictive then the federal standards (COE 2008).

The federal Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to designate air basins, or portions thereof, as either “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the national standards have been achieved. The California Clean Air Act, patterned after the federal Act, also requires that areas be designated as “attainment” or “nonattainment,” but with respect to the state standards rather than the national standards. As discussed previously, the project site and greater Humboldt County are located within the NCAB and are subject to the jurisdiction of NCUAQMD. The Humboldt County portion of the NCAB is designated as “nonattainment” with respect to respirable particulate matter of 10 microns or smaller (PM10), and as “attainment” or “unclassified” with respect to the balance of the criteria pollutants (COE 2008).1

NCUAQMD monitors ambient criteria pollutant concentrations within the NCAB, upon which the above determinations of “attainment” and “nonattainment” are based, through a series of air quality monitoring stations. NCUAQMD air monitoring stations closest to the project site include the Eureka-Jacobs station (717 South Ave.) and the Eureka-I Street station (6th/I St.), located approximately 3 and 4 miles from the project site, respectively. Table 6-1 shows a five-year summary of the highest annual pollutant concentrations for the criteria pollutants monitored at these stations. As indicated, PM10 levels at these stations exceeded the state 24-hour standard during years 2004-2009 and the federal annual standard during two of the years (2004-2009), while ozone and PM2.5 did not exceed applicable standards. It is also noted that, while some state standards are exceeded at these stations, these stations occur in an urban setting (COE) versus the project site which occurs in a more rural setting. Hence, it is likely that criteria pollutant concentrations at the project site are lower than at the monitoring stations, although for purposes of conservatism the levels at the Eureka monitoring stations are used in this analysis.

Ozone

Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG), nitrogen oxides (NOx) and carbon monoxide (CO). ROG, NOx and CO are referred to as precursors to ozone. Significant ozone production requires 3 hours in a stable atmosphere with strong sunlight. Ozone is a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production, and high ozone concentrations can occur miles away from the source of the precursors. Motor vehicles are generally the major source of ozone precursors. Other sources include natural gas combustion hearth emissions, landscaping emissions, and architectural coatings. Hearth emissions occur in winter, and therefore do not generally contribute to the formation of ozone. Short-term exposure to ozone can result in injury and damage to the lungs, decreases in pulmonary function, and impairment of immune mechanisms, and these changes have been implicated in the development of chronic lung disease as the result of longterm exposure. In addition, effects on vegetation have been documented at concentrations below the standards (COE 2008).

1 “Attainment” means within allowable limits, “nonattainment” means beyond or in exceedance of allowable limits, and “unclassified” means not classified on the basis of the information available.

Table 1

CRITERIA POLLUTANT CONCENTRATIONS IN THE PROJECT AREA, 2004-2008

Pollutant	State Std.[a]	National Std.[a]	Pollutant Concentration by Year[b]				
			2004	2005	2006	2007	2008
Ozone (ROG, NOx, CO)							
Highest 1-hour average, ppm	0.09	--	d	d	0.04	0.06	0.05
Days over State Std.			d	d	0	0	0
Days over National Std.[f]			d	f	f	f	f
Highest 8-hour average, ppm	0.07[c]	0.08	d	d	0.04	0.05	0.05
Days over National Std.			d	d	0	0	0
Respirable Particulate Matter (PM_{10})							
Highest 24-hour average (state national), µg/m^3	50	150	**64**/61	**71**/67	**72**/68	**54**/50	47/46
Days over State Std.			2	1	12	4	d
Annual average, µg/m^3	20[e]	--	**21**	14	**20**	e	e
Fine Particulate Matter (PM2.5)							
Highest 24-hour average, µg/m^3	--	65	26	32	35	34	21
Days over National Std.			0	0	0	0	0
Annual average, µg/m^3	12	15	8	d	8	8	d

Note: **Bold** = in excess of standards; ppm = parts per million; µg/m3 = micrograms per cubic meter.
a COE 2008.
b CARB 2008b (ozone data is from the Eureka-Jacobs monitoring station, while PM_{10} and $PM_{2.5}$ data is from the Eureka-I Street monitoring station).
c In 2006, the State approved amendments to the regulations for the State Ambient Air Quality Standard for ozone establishing a new 8-hour average ozone standard of 0.070 parts per million (ppm).
d No data available.
e The national annual PM_{10} standard was revoked in December 2006 (CARB 2008b).
f The national 1-hour ozone standard was revoked in June 2005 (CARB 2008b).
Source: Compiled by Planwest Partners, March 2009.

As shown in Table 1, the state and national ozone standards were not exceeded at the Eureka air quality monitoring stations during the last five years, and as discussed previously, the NCAB is in attainment for ozone (COE 2008). Ozone is currently emitted from the project site in small quantities associated with equipment used in periodic selective logging at the site under the existing NTMP, but these emissions do not contribute to exceedances of ozone standards or to nonattainment for ozone as no such conditions currently exist.

Particulate Matter (PM_{10} and $PM_{2.5}$)
Particulate matter (both PM_{10} and $PM_{2.5}$) can be inhaled and cause adverse health effects. Very small particles in particular (e.g., $PM_{2.5}$) can cause lung damage directly or may contain adsorbed gases that can be injurious to health (COE 2008).

Particulate matter in the atmosphere results from many kinds of dust- and fumeproducing
industrial, agricultural and logging operations, combustion, driving on unpaved roads, and atmospheric photochemical reactions. In rural areas, agricultural activities (tilling, disking and field burning) and logging (tree cutting, burning of slash) are the major sources of particulate matter. In urban areas, vehicle and equipment use, demolition activities, and construction activities are the major sources. In both areas, wood-burning stoves and fireplaces are also a major source of particulates and can cause exposure in residential areas, especially during winter when their use is high and meteorological conditions to prevent the dispersion of associated particulates (COE 2008).

In the Eureka area, particulate emission result primarily from logging activities, woodburning
stoves/fireplaces, and driving on unpaved roads. As shown in Table 1, the state 24-hour standard for PM_{10} was exceeded at the Eureka air quality monitoring stations during four of the last five years, and the federal annual standard was exceeded during two of the last five years. Also, as discussed previously, the air basin in which the project site is located (NCAB) is in "nonattainment" for PM_{10}. Particulate matter is currently emitted from the project site in small quantities associated with the periodic selective logging at the site under the existing NTMP. These logging activities contribute a minor amount to existing PM_{10} emissions in the area, to the exceedance of standards at the monitoring stations, and to the NCAB's existing nonattainment status for PM_{10}.

Toxic Air Contaminants
TACs are compounds known to cause cancer and other acute health effects. Three families of TACs are monitored by the CARB: (1) thirty-three VOCs such as acetone, benzene, formaldehyde and methyl bromide; (2) six polycyclicaromatic hydrocarbons such as benzo(a)pyrene-10; and (3) thirty-four metals such as arsenic, cadmium, lead and mercury. Land uses often associated with high levels of TAC emissions include industrial facilities, wastewater treatment plants, refineries, and chemical plants. Motor vehicle traffic also generates some TAC emissions. Long-term exposure to TACs can cause health problems, including cancer and respitory ailments, and CARB has health-based thresholds (e.g., acceptable/unacceptable cancer risk percentages) which it uses to assess the potential exposure risks to TACs (COE 2008).

CARB monitoring of TACs does not occur at CARB air quality monitoring stations but rather occurs associated with individual TAC-emitting facilities (local examples include the Evergreen Pulp Mill in Samoa and PG&E's Humboldt Bay Power Plant near King Salmon). There are no uses in the vicinity of the project site known to emit high levels of TACs.

Regulatory Setting

Federal Clean Air Act and California Clear Air Act. Regulation of air quality is achieved through implementation of national and state ambient air quality (concentration) standards and enforcement of emissions limits for individual sources of air pollutants. The federal Clean Air Act required the US EPA to identify National Ambient Air Quality Standards (national standards) to protect public health and welfare. National standards have been established for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), suspended particulate matter (PM_{10} and $PM_{2.5}$), and lead. These pollutants are called "criteria" pollutants because the corresponding ambient standards satisfy criteria specified under the Clean Air Act. The State of California has established its own ambient air quality standards (state standards) that are generally more stringent, or health-protective, than their national counterparts (COE 2008). Table 2 presents the federal and state ambient air quality standards for the criteria pollutants.

California Air Resources Board Regulatory Activities. The CARB, California's air quality management agency, regulates mobile source emissions and oversees the activities of air pollution and air quality management districts. The CARB indirectly regulates local air quality by having established state ambient air quality standards and vehicle emission standards, conducting research activities, and by planning and coordinating activities (COE 2008).

Table 2

STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS

Pollutant	Average Time	State Standard[a]	National Standard[a]
Ozone	1 hour	0.09 ppm	--
	8 hour	0.07[b] ppm	0.08 ppm
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm
	8 hour	9.0 ppm	9 ppm
Nitrogen Dioxide (NO_2)	1 hour	0.25 ppm	--
	Annual average	--	0.053 ppm
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	--
	24 hour	0.04 ppm	0.14 ppm
	Annual average	--	0.03 ppm
Respirable Particulate Matter (PM_{10})	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual average	20[d] $\mu g/m^3$	--
Fine Particulate Matter ($PM_{2.5}$)	24 hour	--	65 $\mu g/m^3$
	Annual average	12 $\mu g/m^3$	15 $\mu g/m^3$
Lead	Monthly average	1.5 $\mu g/m^3$	--
	Quarterly	--	1.5 $\mu g/m^3$

Note: ppm = parts per million; µg/m3 = micrograms per cubic meter.
[a] COE 2008 and CARB 2009c.
[b] In, 2006, the State approved a new 8-hour average ozone standard of 0.070 ppm.
Source: Compiled by Planwest Partners, March 2009.

NCUAQMD Stationary Source Standards. The NCUAQMD, one of 35 air districts in California, is the regional agency empowered to regulate air pollution emissions from stationary sources in the Humboldt, Trinity, and Del Norte County portions of the NCAB. As with the other air districts in the state, NCUAQMD operates independently and has its own set of regulations and programs to address emissions from stationary, area and mobile sources consistent with state and federal laws, regulations, and guidelines. NCUAQMD regulates air quality through its permit authority over most types of stationary emissions and through its planning and review activities. It also operates air quality monitoring stations that provide information on ambient concentrations of criteria air pollutants (COE 2008). The NCUAQMD has indicated that it is appropriate for lead agencies to compare proposed project emissions to its stationary source significance thresholds. These thresholds include: CO - 100 tons per year (tpy); NO_x - 40 tpy; ROG - 40 tpy; and PM_{10} - 16 tpy (COE 2008).

NCUAQMD PM_{10} Attainment Plan. To address the NCAB's "nonattainment" status for PM_{10}, the NCUAQMD prepared a draft PM_{10} attainment plan identifying costeffective control measures that can be implemented to bring ambient PM_{10} levels to within California standards. The control strategies include transportation control measures (public transit, ridesharing, vehicle buy-back program, traffic flow improvements, bicycle incentives, etc.), land use measures to reduce reliance on automobiles, and open burning measures (NCUAQMD 1995).

NCUAQMD Registration Program for Naturally Occurring Asbestos. The NCUAQMD is required by State law to implement and enforce all State Airborn Toxic Control Measures (ATCMs). The NCUAQMD has instituted a registration program for construction, grading, quarrying, and surface mining operations, and applicants must register with the NCUAQMD prior to engaging in specific activities covered by the regulation. As part of the registration process, the applicant may be required to submit a dust control plan. Notification must be made to the NCUAQMP at least 14 days before activity begins. However, the program includes a series of exemptions. One of these exemptions is for projects that are located in an area not designated as an ultramafic rock unit area by the California Department of Conservation Division of Mines and Geology (COE 2008; NCUAQMD 2009). The project site is not located within an area of mapped ultramafic rock (DOC, 2000). Therefore, the proposed project is exempted from the NCUAQMD asbestos registration program.

NCUAQMD Rule 430 – Fugitive Dust Emissions. NCUAQMP Rule 430 prohibits the handling, transporting, or open storage of materials in such a manner that allows or may allow unnecessary amounts of particulate matter from becoming airborne. The rule requires project applicants to take reasonable precautions to prevent particulate matter from becoming airborne including, but not limited to, the following (COE 2008):

1. Covering trucks when used for transporting materials likely to give rise to airborne dust.
2. Installing and using hoods, fans, and fabric filters to enclose and vent the handling of dusty materials, and requiring containment methods during sandblasting and other similar operations.
3. Conducting agricultural practices in a way that minimizes the creation of airborne dust.
4. Using water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads, and the clearing of land.

5. Applying asphalt, oil, water or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dust.
6. Paving roadways and maintaining them in a clean conduction.
7. Promptly removing earth or other material from paved streets onto which earth or other material has been transported by construction equipment, wind, water, or other means.
The above measures would be enforced by Humboldt County in the context of the grading permit(s) to be issued by the County for the proposed project.

Following is Page 121 from the 1994 Program EIR on Gravel Removal from the Lower Mad River, Certified May 31, 1994, which assessed CEQA compliance with respect to air quality Permits to Operate. The analysis and required mitigation remains pertinent today.

Impact Statements and Mitigation Measures

Impact

Air-1: Gravel extraction operations involve the use of gasoline or diesel-powered equipment that emit exhaust emissions. The air emissions are regulated by the NCUAQMD. There is no evidence that exhaust emission resulting from the project cause significant impacts. (LS/LS)

Mitigation Measures

Since no significant impact was identified, no mitigation is required.

Monitoring

North Coast Unified Air Quality Management District

Impact

Air-2: The project may involve the generation of dust. Dust emissions are regulated by the NCUAQMD. Some operations coupled with dry weather and heavy winds can emit fugitive dust in excess of adopted standards. This would be a significant impact. (PS/LS)

Mitigation Measures

Mit-11: Implement mitigation measure Mit-11 (watering roads and processing areas). This will reduce dust by approximately 50% (RSE, 1993).

Mit-12: All operational traffic shall observe a maximum speed limit on unpaved roads of 20 m.p.h. This will reduce dust by approximately 65-80% (RSE, 1993).

Monitoring

Scientific Design and Review Committee
North Coast Unified Air Quality Management District

Significance after Mitigation

Less than significant. The combined measures will significantly reduce fugitive dust.

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