# Draft Supplemental Programmatic Environmental Impact Report for Gravel Extraction on the Lower Mad River

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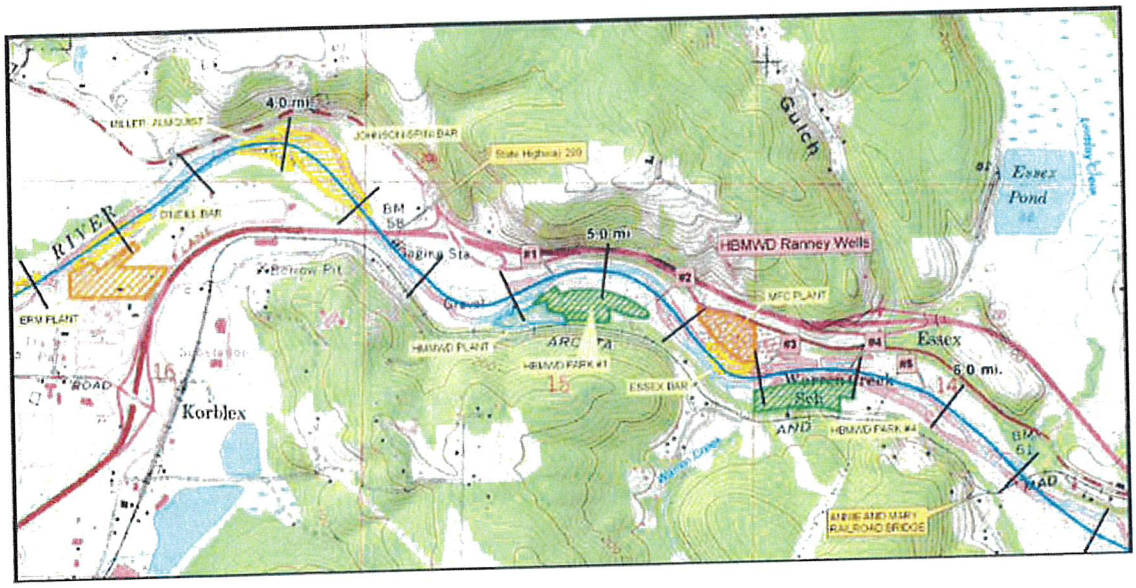


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# Executive Summary

This document is the 2014 Draft Supplemental Programmatic Environmental Impact Report (SPEIR) on gravel extraction on the lower Mad River; it is the product of numerous drafts, comments, responses, and meetings between the County, the gravel operators, resource agencies, and the County of Humboldt Extraction Review Team (CHERT). In January 2009, a Draft SPEIR was circulated and comments were received; we have incorporated agency and public comments into this 2013 Draft SPEIR. Because four years have elapsed since 2009, the County decided to circulate a new Draft SPEIR.

The Proposed Project is to continue gravel extraction and the CHERT adaptive management program on the lower Mad River. The project described in this report is updated from that described in 2009. Four important updates, among numerous others, include:

- Calculating extraction volumes using two methods. They are the current Mean Annual Recruitment method and the National Marine Fisheries Service's (NMFS) new Fractional Extraction Volume method. If the two methods result in recommended extraction volumes that vary widely, then the operator(s), CHERT and NMFS scientists, and the County will either 1) allow extraction to whatever volume estimate is lowest, or 2) meet and come to a consensus decision.
- Annually planning and, when agencies and operators agree, implementing salmonid habitat improvement projects. Steps in this implementation are assessing enhancement needs, selecting and prioritizing specific projects, monitoring, and identifying funding sources.
- Contracting a riparian specialist to assist the CHERT scientists. This specialist's tasks would include defining "desired riparian conditions and vision", assisting in pre-extraction plan review, contributing to post-extraction reports, and assisting in riparian mitigation or enhancement projects associated with gravel extraction.
- Designing and implementing a study that addresses if and how alcoves can be used as an extraction technique, such that the alcoves benefit red-legged frogs but not bullfrogs.

Four alternatives to the Proposed Project were evaluated and considered:

1. Alternative 1. Continue to extract gravel from the Mad River, with an administrative change in the CHERT adaptive management program by reinstating the Surface Mining Advisory Committee.
2. Alternative 2. Continue to extract gravel from the Mad River, with an administrative change of disbanding the CHERT scientist team, and having County staff take on CHERT scientist responsibilities.
3. Alternative 3. Obtain river-run gravel from sources outside of watershed, discontinuing gravel extraction on the Mad River.
4. Alternative 4. Obtain river-run gravel from Mad River upland terraces, using pit mining techniques.

Of these four alternatives, Alternatives 1 and 2 were considered for further analysis. Alternatives 3 and 4 were not further considered because they do not meet the Project's purpose and objectives, and are likely to have greater significant impacts than the Proposed Project or Alternatives 1 and 2.

For the Proposed Project, 52 potential impacts are identified, and all are considered less than significant and no mitigation is required. A table summarizing the impacts, their significance determination, and mitigation required, if any, is at the end of this Executive Summary. One potential impact, "Wild-8", could affect red-legged frogs (*Rana aurora*) by increasing suitable bullfrog (*Rana catesbeiana*) habitat, thus supporting predators of red-legged frogs; however, the Proposed Project's adaptive management program was engaged such that

wetland pits are not allowed until a lower Mad River bullfrog and red legged frog study is conducted. The study would identify and determine whether additional extraction technique guidelines (such as the timings, locations, and depths of extraction pits and alcoves) could be developed to favor red-legged frogs and suppress bullfrogs.

When the Proposed Project and Alternatives 1 and 2 were evaluated against a number of criteria, the Proposed Project met more of them than either alternative. The criteria were:

- Extent to which the Proposed Project or alternative reduces ecological impacts to less than significant
- Extent to which the Proposed Project or alternative reduces ecological impacts in the short-term
- Extent to which the Proposed Project or alternative reduces ecological impacts in the long-term
- Extent to which the Proposed Project or alternative reduces cumulative impacts
- Ease of implementation by County
- Ease of implementation by operators
- Ease of implementation by resource agencies
- Feasibility in terms of timing of winter flows and mining windows
- Public acceptance
- Public participation

Therefore the Proposed Project (continued gravel extraction with adaptive management on the lower Mad River) is the Preferred Project. The Proposed Project is also the Environmentally Preferred Alternative.

A summary table of the Proposed Project's impacts and significance determinations is as follows [Note: a table of acronyms and abbreviations used in the table follows the table]:

**Proposed Project's impacts and significance determinations**

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, if Any |
|---|---|---|---|
| Air-1 and Air-2, 1994 PEIR | Gravel extraction and diesel combustion could increase PM10 concentrations | Less than significant. If a Permit to Operate is granted, generation of PM10 is considered less than significant; also increases in the rate of PM10 generation are not anticipated in the future. Implementing 2008 diesel regulations (see Section 3.1) will allow operators to meet equipment and vehicle "turnover" targets. | None required |
| Air-3, Notice of Preparation 2007 | Diesel vehicles could emit and increase "greenhouse gases" (GHG). | Less than significant. Future CO2e emissions from the Proposed Project are determined to be 0.07% to 0.19% of the County's 2020 CO2e emissions goal of 90% of the County's 2003 emissions, or 1.1 million tons/yr. | None required |
| Air-4, Notice of Preparation 2007 | Gravel extraction could increase exposure to naturally occurring asbestos (NOA) | Less than significant. Exemptions to NOA regulation may be allowed if at "crushing, screening and conveying operations, stockpiles, and off-site material transport at a sand and gravel operation... the operation processes only material from an alluvial deposit" (CARB 2006). | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, if Any |
|---|---|---|---|
| Veg-1, 1994 PEIR | Extraction could remove riparian forests and habitat. | Less than significant. To protect riparian vegetation, the operations' BOs, permit measures, and CHERT practices include avoidance, providing buffers between existing vegetation and extraction areas, transplanting any vegetation that is disturbed, and mitigating for any direct losses. | None required |
| Veg-2, 1994 PEIR | Extraction could remove riparian vegetation leading to bank instability and meandering. | Less than significant. Bank erosion is a function of peak flows and geomorphic setting. In upstream bars, the channel bed is generally lowering (elevation is decreasing) and in downstream bars, the channel bed is rising (elevation is increasing). | None required |
| Veg-3, 1994 PEIR | Extraction could affect successional development of gravel bars, terraces, and vegetation. | Less than significant. CHERT recommends extraction from the same general areas, allowing riparian vegetation to go through succession until river processes disrupt the succession. | None required |
| Veg-4, CDFW March 2009 letter | Riparian habitat area has not increased since 1994; the Project has not created more riparian habitat area. | Less than significant. CDFW did not agree with the 1992 biological resources baseline used to determine significance (see Section 3.2.5) but did not specify an alternative baseline. In the June 2009 meeting, CHERT scientists questioned: 1) what a desired riparian condition would be, given the disturbance ecology of the lower Mad River, and 2) whether gravel extraction techniques should be expected to improve riparian conditions that result from watershed-wide land uses. The CHERT team will contract a riparian specialist to assist in reviewing pre-extraction plans, thus continuing to avoid and minimize impacts to riparian vegetation. | None required |
| Fish-1, 1994 PEIR | Unregulated bar skimming extraction could create broad, shallow channels that impede fish migration. | Less than significant. Bar skimming is regulated by resource agencies through the CHERT program; CHERT's policy of avoiding skimming near the heads of point bars reduces potential channel widening, and reduces the width of transverse bars that could impede migration. No metric specifically measures transverse bar widths, lengths, or durations, although CHERT policy has likely improved transverse bar conditions since 1992. | None required |
| Fish-2, 1994 PEIR | Channel degradation could create barriers at tributary mouths, affecting fish migration. | Less than significant. Sustained yield management appears to have improved fish access at tributary mouths, which reduces the chances of tributary mouths becoming fish passage barriers. | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, If Any |
|---|---|---|---|
| Fish-3, 1994 PEIR | Extraction could alter morphology of spawning sites and gravel composition. | Less than significant. A spawning area decrease was noted (Stillwater Sciences 2009) but further review indicates that the data are not comparable between years so no trend is apparent. | None required |
| Fish-4, 1994 PEIR | Extraction could impede juvenile fish migrations due to placement and removal of summer bridges. | Less than significant. Rearing habitat for juvenile salmonids has increased compared to 1970s and 1980s habitat areas. Design and locations of summer bridges are stipulated in LOPs and BOs. | None required |
| Fish-5, 1994 PEIR | Extraction trenches could reduce riffles, affecting juvenile salmonids and macro-invertebrates. | Less than significant. CHERT and operators decide where to locate trenches and alcoves such that riffles are not minimized, reduced, or eliminated | None required |
| Fish-6, 1994 PEIR | Extraction reduces habitat diversity and LWD. | Less than significant. LWD that reaches the sites will be retained, increasing habitat diversity. If LWD enters an extraction site, CHERT recommendations and the LOP requirements ensure that it is retained onsite (Section 2.1.6). However, the public often tries to harvest large wood for firewood. Operators limit public access through controlling roads and posting signs (Section 2.1.6.1). | None required |
| Fish-7, CDFW March 2009 letter | Extraction creates impacts on critical salmon and steelhead habitat. | Less than significant. Declines in salmonids are correlated with sustained yield extraction but many land uses, hydrologic regimes, and marine conditions are causes. | None required |
| Fish-8, CDFW March 2009 letter | Extraction operations can result in increased bank-full width, streambed simplification, and reduced pool depths. | Less than significant. Bank erosion is correlated with peak flows, and width is primarily dependent on bank material erodibility (see Section 3.3.3). Channel width of upstream sites has increased but at downstream sites it has decreased. At sustained yield extraction rates, no cause and effect has been documented. | None required |
| Wild-1, 1994 PEIR | Sustained yield extraction and gravel processing could affect wildlife habitat directly and cumulatively; wildlife habitat is defined as local, riparian habitat. | Less than significant. Riparian vegetation trend analysis indicated little net gain or loss in area from 1994 to 2007, but riparian quality has increased through improvements in extraction techniques (Section 3.2.1). | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, if Any |
|---|---|---|---|
| Wild-2, 1994 PEIR | Extraction could create excessive noise on "rare or threatened" wildlife. | Less than significant. A formal information pathway is defined for County staff who regulate noise impacts, to become aware of sensitive species present, and to pass that information to CHERT scientists and gravel operators. | None required |
| Wild-3, 1994 PEIR | Extraction could create dust on riparian vegetation inhibiting plants and insects. | Less than significant. A formal information pathway is defined for NCAQMD staff to inform the operators. Compliance with the dust control plan includes watering roads or using chemical road binders to reduce dust formation during operational hours. | None required |
| Wild-4, 1994 PEIR | Extraction could affect local riparian habitat of TES bird species, specifically the willow flycatcher. | Less than significant. In the operations' BOs, measures for protecting riparian vegetation include avoidance, minimum buffer widths, and mitigating for any direct losses (Section 2.1.6). Riparian vegetation trend analysis indicated little net gain in area from 1994 to 2007, but riparian quality has increased through improvements in extraction techniques (Section 3.2.1.2) | None required |
| Wild-5, 1994 PEIR | Extraction could affect northern red legged frogs, through disturbance of breeding and habitat areas. | Less than significant. The project likely has had beneficial impacts on northern red-legged frog breeding and habitat areas. Aquatic habitat area, as measured by alcove and gravel pit wetland areas, has been monitored annually since 2004. Locations for gravel pit wetlands are selected based on their potential longevity, with recognition that they will evolve and eventually disappear (Section 3.2.2). See Wild-8. | None required |
| Wild-6, 1994 PEIR | Extraction could affect foothill yellow-legged frogs, through disturbance of breeding and habitat areas. | Less than significant. See explanation for Wild-5 northern red-legged frog. | None required |
| Wild-7, 1994 PEIR | Extraction could affect northwestern pond turtles, through disturbance of breeding and habitat areas. | Less than significant. See explanation for Wild-5 northern red-legged frog. | None required |
| Wild-8, CDFW March 2009 letter | Extraction could affect bullfrogs, by increasing their habitat. | Less than significant. As part of the CHERT adaptive management program, wetland pits are no longer allowed until studies are performed. A lower Mad River bullfrog and red legged frog study will be conducted. | None required. |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, If Any |
|---|---|---|---|
| Fish-9, CDFW March 2009 letter | Extraction could affect longfin smelt. | Less than significant. Based on factors likely affecting longfin smelt, conditions could improve. HBMWD surface diversions are much decreased and could cease altogether. Commercial fishing off the coast is also much decreased. Salmonid predation could also be much decreased, due to decreases in salmonid populations. | None required |
| Morph-1, 1994 PEIR | Extraction could cause "excessive" channel degradation that jeopardizes structures. | Less than significant. The Project supports sustained yield management and extraction will be maintained within a range of estimated mean annual recruitment and annual fractional extraction volumes, and below the cap set by COE. Generally, in upstream bars, the channel bed is lowering (elevation is decreasing) and in downstream bars, the channel bed is rising (elevation is increasing). | None required |
| Morph-2, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects aquatic habitat. | Less than significant. See "Wild" and "Fish" impacts for detailed evaluation of potential aquatic habitat impacts. | None required |
| Morph-3, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects groundwater elevations. | Less than significant. In the 1994 PEIR, channel degradation was assumed to lift river terraces above the river, lower the water table, and produce a corresponding migration of phreatophytic vegetation, riparian habitat, and wetland habitat towards the river thalweg. Riparian habitat area has not substantially increased or decreased since 1994 but riparian habitat quality has increased through extraction techniques such as wetland pits and alcoves, and by avoidance of areas that could mature into riparian habitat. | None required |
| Morph-4, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects bank stability. | Less than significant. CHERT monitors river banks by reviewing cross section surveys, and increases stability by discouraging removal of riparian vegetation. CHERT established that bank erosion is primarily a function of peak discharge and geomorphic setting. | None required |
| Morph-5, 1994 PEIR | Extraction could cause "excessive" channel aggradation or degradation that affects channel flood carrying capacity. | Less than significant. Generally, in upstream bars, the channel bed is lowering (elevation is decreasing) and channel width is increasing, however, similar increases in width and bank erosion affect both mined and unmined sites. In downstream bars, the channel bed is rising (elevation is increasing) and bank erosion is dependent on bank material stability. | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, if Any |
|---|---|---|---|
| Morph-6, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects "river resources" as documented by site specific effects. | Less than significant. To address site specific conditions, pre-extraction designs are annually reviewed for each site, and post-extraction activities are also monitored and reviewed. Gravel pit wetlands have been constructed on Christie, Blue Lake, and Emmerson bars. | None required |
| H2OQlty-1, 1994 PEIR | Extraction could cause a short-term increase in suspended sediment, as measured by turbidity, during high flows. | Less than significant. Based on the EPA's TMDL evaluations, gravel extraction is likely not a significant source of suspended sediment during high flows. | None required |
| H2OQlty-2, 1994 PEIR | Summer bridges or crossings could cause a short-term increase in suspended sediment, as measured by turbidity, during low flows. | Less than significant. Based on the EPA's TMDL evaluations, summer bridges are likely not a significant source of suspended sediment. | None required |
| H2OQlty-3, 1994 PEIR | Extraction by skimming could increase channel width and water temperature. | Less than significant. Skimming and increased channel width are not causal; channel width is correlated to annual peak flows and bank material. | None required |
| H2OQlty-4, 1994 PEIR | Extraction equipment could spill or leak petroleum products on to the gravel bar, which could be entrained when flows increase in the winter. | Less than significant. Operations will comply with and fulfill requirements of their WDRs and will follow Best Management Practices. | None required |
| PU&S-1, 1994 PEIR | Mad River Fish Hatchery weir, and rock slope protection, RM 11 | Less than significant impact because the weir is no long used and State agencies would like to remove the weir and its associated rock slope protection, thus any continued degradation will not require repair work | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, If Any |
|---|---|---|---|
| PU&S-2, 1994 PEIR | Bank stabilization ("rip rap") on Hatchery Road, RM 9.7 | Less than significant impact. This location is inherently dynamic, as evidenced by the need for emergency measures in 2005. Some recent bank erosion at gaps in riprap are unrelated to gravel extraction. Pre-extraction plans for Guynup and Emmerson bars recommend volumes and techniques that minimize effects on the bank stabilization | None required |
| PU&S-3, 1994 PEIR and PU&S-4, 1994 PEIR | Hatchery Road Bridge (called Blue Lake bridge in 1994 PEIR), and Blue Lake right bank levee, RM 9.4 | Less than significant impact. Since 1992, mean elevation increased slightly at Blue Lake bar from 1993 to 1997, but then decreased from 1997 to 2003 for net degradation from 1993 to 2003. Presently they appear secure. Extraction plans for nearby operations will recommend volumes and techniques that minimize effects on the bank stabilization. | None required |
| PU&S-5, 1994 PEIR | Blue Lake sewage ponds and levee, RM 8.7 | Less than significant impact. Extraction will be limited to sustained yield extraction volumes, to minimize effects of degradation on sewage ponds and levees. | None required |
| PU&S-5.1 | Power's Creek | Less than significant impact. Appears stable but remains a fish migration barrier. Limiting extraction to sustained yield extraction volumes will decrease rate of degradation. NMFS and partners are pursuing plans for a fish access structure to aid passage. | None required |
| PU&S-6, 1994 PEIR | Highway 299 Mill Cr bridge, RM 7.0 | Less than significant impact. The site has a new (2012) concrete fish ladder structure that both stabilizes the channel bed elevations and ensures fish passability. | None required |
| PU&S-7, 1994 PEIR | North Coast RR Authority bridge and water line, RM 6.2 | Less than significant impact. Aggradation is currently minimizing impacts already experienced during past periods of channel degradation. | None required |
| PU&S-8, 1994 PEIR | Glendale Drive bridge over Lindsay Cr, RM 6.1 | Less than significant impact. Bridge was recently re-built and channel appears passable to fish. Aggradation will likely minimize elevational differences between Lindsay Creek and the Mad River. | None required |
| PU&S-9, 1994 PEIR | Highway 299 bridge over Lindsay Cr, RM 6.1 | Less than significant impact. Channel appears passable to fish. Aggradation will likelhy minimize elevational differences between Lindsay Creek and the Mad River. | None required |

| Impact Designation, Source | Impact Description | Significance Determination | Mitigation Required, If Any |
|---|---|---|---|
| PU&S-10, 1994 PEIR | Railroad trestle over Warren Cr, RM 5.3 | Less than significant impact. Aggradation will likey reduce likelihood of pier scour. Recently reconstructed bridge supports are designed to tolerate channel elevation changes in a dynamic river system. | None required |
| PU&S-11, 1994 PEIR | Warren Cr Road bridge, RM 5.3 | Less than significant impact. Bridge appears stable and channel appears passable to fish. | None required |
| PU&S-12, 1994 PEIR | Structures of the HBMWD, between RM 4.6 and 5.9 | Less than significant impact. Aggradation will likely reduce scour around the Ranney collectors and at the direct intake. | None required |
| PU&S-13, 1994 PEIR And PU&S-14, 1994 PEIR | Upper and lower HBMWD water pipe crossing, RM 4.9 and RM 4.0 | Less than significant impact. Aggradation will likely reduce scour around the pipe crossings. | None required |
| PU&S-16, 1994 PEIR | Highway 299 bridges, RM 4.0 | Less than significant impact. Aggradation will continue to reduce scour around the bridge footings. | None required |
| PU&S-17, 1994 PEIR | PG&E upper gas line via the Highway 299 bridge | Less than significant impact. Aggradation will continue to reduce scour around the bridge footings. | None required |
| PU&S-17.1 | McKinleyville Community Services District water pipe crossing, RM 3.4 | Less than significant impact. Aggradation will continue to reduce scour around the pipeline crossing. | None required |
| PU&S-18, 1994 PEIR | Highway 101 bridge, RM 1.8 | Less than significant impact. New construction brings bridge supports up to current design standards. | None required |
| PU&S-19, 1994 PEIR | Hammond Trail bridge RM 0 | The bridge marks the end of the project area of the 1994 PEIR. Recent surveys indicate the aggradation process found upstream also extends to this reach. | None required |

# Acronyms and Abbreviations

| Abbreviation or Acronym | Definition |
|---|---|
| BO | Biological Opinion |
| CARB | California Air Resources Board |
| CCR | California Code of Regulations |
| CDFG | California Department of Fish and Game |
| CDFW | California Department of Fish and Wildlife |
| CEQA | California Environmental Quality Act |
| CHERT | County of Humboldt Extraction Review Team |
| COE | Corps of Engineers |
| EIR | Environmental Impact Report |
| ESU | Evolutionary Significant Unit |
| FEV | Fractional extraction volume |
| GHG | Greenhouse gases |
| HBMWD | Humboldt Bay Municipal Water District |
| HCPBD | Humboldt County Planning and Building Department |
| HCDCDS | Humboldt County Department of Community Development Services |
| KRIS | Klamath Resource Information System |
| LOP | Letter of Permission |
| LWD | Large woody debris |
| MAR | Mean annual recruitment |
| MOU | Memorandum of Understanding |
| MRB | Mad River Biologists |
| MWAT | Maximum weekly average temperature |
| NCUAQMD | North Coast Unified Air Quality Management District |
| NMFS | National Marine Fisheries Service |
| NOA | Naturally occurring asbestos |
| NOP | Notice of Preparation |
| NRM | Natural Resources Management |
| PEIR | Programmatic Environmental Impact Report |
| PM10 | Particulate Matter less than 10 microns |
| RM | River mile |
| RWQCB | Regional Water Quality Control Board |
| SAA | Streambed Alteration Agreement |
| SDRC | Scientific Design and Review Committee |
| SMAC | Surface Mining Advisory Committee |
| SMARA | Surface Mining and Reclamation Act |
| SNTEMP | Stream Network Temperature model |
| SPEIR | Supplemental Programmatic Environmental Impact Report |
| SWRCB | State Water Resources Control Board |
| TES | Threatened and Endangered Species |
| TMDL | Total maximum daily load |
| USBLM | United States Bureau of Land Management |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| WDR | Waste Discharge Requirement |
| WY | Water year |
| XS | Cross section |

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# 1 INTRODUCTION

Under the California Environmental Quality Act (CEQA) Guidelines §15162(a)(3)(A), the Lead Agency has determined that new information of substantial importance, which was not known and could not have been known in 1994 (when the previous EIR was certified), shows that "the project will have one or more significant effects not discussed in the previous EIR." Examples of such new information include the presence of bullfrogs in the Mad River watershed, and their effects on yellow- and red-legged frogs. Another example of new information is the creation of revised methodologies and estimates of gravel sustained yield volume. A third example is the recognition of the importance of climate change and greenhouse gas emissions. Therefore, the Lead Agency determined that a subsequent EIR should be prepared.

Further, the Lead Agency has determined that the subsequent EIR should be a supplemental EIR because under §15163(a)(1) and (2), the Lead Agency has determined that (1) a subsequent EIR is required, and (2) "only minor additions or changes would be necessary to make the previous EIR adequately apply to the project in the changed situation." These minor additions include changes and additions to the adaptive management program described in the 1994 EIR, such as replacing a wetlands botanist on the adaptive management team. Another minor addition is to perform studies on the impacts and benefits of certain extraction techniques (wetland pits or alcove creation) on bullfrogs and yellow- and red-legged frogs. The core concept of the 1994 PEIR, to establish and implement an adaptive management program, is preserved.

Therefore, a subsequent and supplemental EIR is being prepared and applied to the "Programmatic EIR on Gravel Removal from the Lower Mad River, Humboldt County, California," which was certified by the Humboldt County Board of Supervisors on May 31, 1994.

The purpose of an EIR is "to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided" (CEQA Section 21001.1(a)). This Draft SPEIR meets this purpose by presenting and discussing effects, alternatives, and mitigation measures. Under CEQA Section 15003, "technical perfection" of the significant effects analyses is not required, but "adequacy, completeness, and a good-faith effort at full disclosure" are required. Further, CEQA requires that "decisions be informed and balanced."

Based on scientists studies cited in this Draft SPEIR there are different degrees of the severity of effects from gravel extractions. The public and decision-makers must determine whether the Project or its alternatives should go forward. Moving forward is possible by considering and applying the following questions to the scientists' statements and conclusions:

- Are data specific to the Mad River available to resolve the issue?
- Is the issue supported by analyses indicating causality or correlation? We may see that observations are correlated (for example, when sunspots occur, stock prices rise) yet they may not be causal (sunspots do not cause higher stock prices).
- How much uncertainty is there in the scientists' conclusions? If uncertainty is high, decisions based on highly uncertain conclusions should be cautious.
- Have conclusions been peer reviewed or supported in the literature? The quality of scientific analysis is "policed" by peer review, which generally occurs when evaluations and results are published in a peer reviewed forum such as journals or conference proceedings.

By considering the above questions, we can still make informed and balanced decisions on the effects of gravel extraction on the lower Mad River. This SPEIR presents the interpretations from numerous scientists representing CHERT, NMFS, and CDFW; their interpretations are considered in the context of the above four questions, in the impact analyses of this Draft SPEIR.

## 1.1 Background

This Draft SPEIR is the product of numerous drafts, comments, responses, and meetings between the County, the operators, resource agencies, and the CHERT team. In January 2009, a Draft SPEIR was circulated and comments were received (Appendix A); agency and public comments have been incorporated into this 2012 Draft SPEIR. Because three years have elapsed since 2009, the County decided to recirculate a new Draft SPEIR. A Final SPEIR will contain the agency and public comments offered on this 2012 Draft SPEIR.

In September 2007, a Notice of Preparation (NOP) for a Draft SPEIR was published by the Humboldt County Department Planning and Building. The NOP briefly described the agencies involved and the permits required for in-stream gravel mining on the Mad River. As stated in that Notice of Preparation (HCDCDS 2007a):

> "The Humboldt County Mad River in-stream gravel mining program is conducted pursuant to the California Surface Mining and Reclamation Act (SMARA). In-stream mining is also governed by the California Department of Fish and Game (CDFG) through Streambed Alteration Agreements (SAA) and the U.S. Army Corps of Engineers (COE) Letter of Permission (LOP) first adopted in 1996, extended in 2002, and modified in 2003 to accommodate the 2003 mining season. CHERT[1] review of in-stream gravel mining is authorized by SMARA (Public Resources Code, Division 2, Chapter 9, Section 2774 (b), and the 1992 Memorandum of Agreement and Programmatic EIR on Gravel Removal from the Lower Mad River [which was] certified by the Humboldt County Board of Supervisors on May 31, 1994."

In the 1994 PEIR, a monitoring and adaptive management program was developed to support a sustained yield approach to gravel extraction. The science team that provided the analyses for the adaptive management program was called the Mad River Scientific Design and Review Committee (SDRC); the team and the program was cited in the 1994 PEIR as mitigation measure "Mit-1." Since 1994, monitoring data have been collected annually; these data include aerial photographs, surveyed cross sections, hydrologic data, and some biological monitoring data. As stated in the NOP, "sufficient data have been obtained to assess the effectiveness of the adaptive management program based on reach-wide technical analyses."

In addition to the monitoring data, several other events now support the need to review the PEIR. These events include:

- The publishing of several reports that provide estimates of sustainable average annual extraction for the lower Mad River. The reports are:
  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.

[1] "CHERT" is the acronym for County of Humboldt Extraction Review Team, but its previous name was the Scientific Design and Review Committee (SDRC)

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.

- A change in the regulatory status of salmonids and their habitat within the project area, and inclusion of additional species such as northern red-legged frog (*Rana aurora*), northwestern pond turtle (*Clemmys marmorata marmorata*), foothill yellow-legged frog (*Rana boylii*), longfin smelt (*Spirinchus thaleichthys*), and willow flycatcher (*Empidonax traillii*).
- The issuance of a "batched" biological assessment and a Biological Opinion (BO) in March 2009 and July 2010, respectively, and
- The occurrence of several large floods that provide an opportunity to assess the river's response to gravel mining over a relatively wide range of flows.

Therefore, the Humboldt County Planning & Building Department, acting as the Lead Agency, has prepared this 2013 Draft Supplemental PEIR for Gravel Extraction from the Lower Mad River. As described above, numerous documents support this 2013 Draft SPEIR, and are formally incorporated by reference in Table 1-1. The physical locations of these documents are at the Humboldt County Planning and Building Department, 3015 H Street, Eureka, California.

**Table 1-1. Documents that are incorporated by reference.**

| Title, Author | Location | Description |
|---|---|---|
| "Programmatic EIR on Gravel Removal from the Lower Mad River, Humboldt County, California", Humboldt County Planning and Building Department (1994). SCH # 92083049 | On file at Humboldt County Planning and Building Department | This 1994 document evaluated the impacts and mitigations on factors listed in the CEQA checklist of that time |
| Biological Opinion of Letter of Permission 2004-1 for gravel mining and excavation activities within Humboldt County (2004). National Marine Fisheries Service, Southwest Region. [NMFS] National Marine Fisheries Service. | On file at Humboldt County Planning and Building Department | This document states the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) opinion, whether a Federal action (the COE's permitting) is likely to jeopardize the continued existence of a threatened or endangered species (salmonids) or result in the destruction or adverse modification of critical habitat. |
| Biological Opinion for batched consultation, Mad River individual permits. National Marine Fisheries Service, Southwest Region (2004). [NMFS] National Marine Fisheries Service. | On file at Humboldt County Planning and Building Department | |
| "Notice of Preparation", Humboldt County Department of Community Development Services (2007). No SCH number. | On file at Humboldt County Planning and Building Department | This document informed stakeholders and resource agencies that a Draft Supplemental EIR was being prepared |

| | | |
|---|---|---|
| "Draft Supplemental Programmatic EIR on Gravel Extraction on the Lower Mad River", H. T. Harvey & Associates (2009). No SCH number | On file at Humboldt County Planning and Building Department | This 2009 document provides updated information on the CHERT adaptive management program, which was a mitigation measure of the 1994 PEIR |
| "Biological Opinion – Mad River batched gravel mining", [NMFS] National Marine Fisheries Service, Southwest Region (2010) | On file at Humboldt County Planning and Building Department | This 2010 document describes a methodology for estimating gravel that can be extracted, and documents NMFS' findings on incidental take and mitigation measures |

## 1.2 Contents and Scope of this Draft Supplemental PEIR

The required contents of a Draft EIR or Draft PEIR are described in Sections 15122 through 15131 of Title 14 CCR Chapter 3, Article 9. By section number, the required contents are:

15122. Table of Contents
15123. Summary
15124. Project Description
15125. Environmental Setting
15126. Consideration and Discussion of Significant Environmental Impacts, Mitigations, and Alternatives
15127. NA (does not apply to this project)
15128. Effects Found to be Not Significant
15129. Organizations and Persons Consulted
15130. Discussion of Cumulative Impacts
15131. Economic and Social Impacts

In keeping with the guidance that "...the supplement to the EIR need contain only the information necessary to make the previous EIR adequate for the project as revised," the content of this supplement was determined by the:

- Availability of updated information, as described by the items listed in the previous section,
- Environmental effects listed in the Draft Supplemental PEIR's 2007 NOP,
- Public and agency comments received on the Draft Supplemental PEIR's 2007 NOP, and
- Public and agency comments received on the January 2009 Draft Supplemental PEIR.

The 1994 PEIR impact analyses on groundwater recharge and water supply, traffic, noise, and recreation were determined to be sufficient by the County. Instream gravel extraction could not measurably affect groundwater recharge because extraction does not result in large areas of surface water ponding and does not pump groundwater. Under the sustained yield extraction volumes described in the 1994 PEIR, the HBMWD's Ranney wells are not affected, so water supply is also adequately described in the 1994 PEIR. Traffic, noise, and recreation were also evaluated in the 1994 PEIR; these evaluations also continue to apply because less gravel is extracted now than in 1994; impacts from traffic, noise, and recreation would be less than those anticipated in the 1994 PEIR. The project as revised does not require updated evaluations of these five environmental factors.

Given the updated information, the NOP's listed effects, and comments on the NOP and January 2009 Draft Supplemental PEIR, this 2012 Draft SPEIR will be limited to the following environmental factors[2]:

- Air quality, specifically air quality impacts related to fugitive dust emissions, and the potential of extraction operations to mobilize naturally occurring asbestos.
- Biological factors, specifically project effects on riparian and aquatic habitat and these species: Southern Oregon North Coastal California coho (Oncorhynchus kisutch), Northern California steelhead (Oncorhynchus mykiss), Central California Chinook salmon (Oncorhynchus tshawytscha), northern red-legged frog, northwestern pond turtle, foothill yellow-legged frog, bullfrog, longfin smelt, and willow flycatcher.
- Geologic and hydrologic factors, specifically potential impacts on channel aggradation and degradation, channel widening, estimates of recruitment volume and its geomorphological effects, and the benefits of installing large woody debris and other habitat enhancements.
- Utilities and public services, specifically the potential impacts on roads, and bridges and river infrastructure.
- Water quality, specifically potential impacts on sediment and temperature.
- Cultural factors, specifically an evaluation of whether a new cultural factors study is needed.
- Climate change, specifically the potential impacts of creating greenhouse gases through heavy equipment operation.

For descriptions and environmental analyses of the other environmental factors, please refer to the 1994 "PEIR on Gravel Removal from the Lower Mad River" (HCPBD 1994), which is can be accessed online (http://co.humboldt.ca.us/planning/smara/default.asp?inc=slm).

## 1.3 Purpose and Objectives

The purpose of the 1994 PEIR was set by a 1992 Memorandum of Understanding (MOU) between:

- Mad River gravel operators (at that time, they were Eureka Sand and Gravel, Mad River Sand and Gravel, Redwood Empire Aggregates)
- Humboldt County Board of Supervisors
- California Resources Agency
- California Board of Mining and Geology
- California Department of Conservation
- California Department of Fish and Game
- California State Lands Commission

In the 1994 MOU and PEIR, the purpose of the PEIR was stated as "...to evaluate the cumulative effects of gravel extraction and of channel degradation, whatever the cause, on the natural resources, public utilities, and structures in and along the Mad River." The 1994 preferred alternative, which has become this Draft SPEIR's Proposed Project, is a "plan to develop, implement, and monitor flexible, comprehensive, environmentally-sound mining strategies and reclamation standards that will provide a moderate rate of

[2] For the full list of environmental factors, see the "CEQA Checklist" at http://ceres.ca.gov/topic/env_law/ceqa/rev/appg_102698.pdf

recovery from past degradation at critical sites while attempting to provide for continued commercial extraction of Mad River river run sand and gravel and while protecting significant riverine resource values."

The purpose of this Supplemental PEIR remains the same as that of the 1994 PEIR. Re-stating, the project objectives are to:

- Evaluate the cumulative effects of gravel extraction and of channel degradation, whatever the cause, on the natural resources, public utilities, and structures in and along the Mad River, and
- Develop, implement, and monitor flexible, comprehensive, environmentally-sound mining strategies and reclamation standards that will provide a moderate rate of recovery from past degradation at critical sites while attempting to provide for continued commercial extraction of Mad River river-run sand and gravel and while protecting significant riverine resource values.

# 2 DESCRIPTION OF PROPOSED PROJECT

The Proposed Project is continuation of in-stream gravel extraction, with monitoring and adaptive management as described in this section.

## 2.1 Description of Gravel Extraction

### 2.1.1 Locations and Operators

The physical project is the "continuing extraction of river-run sand and gravel, in limited quantities, from ... specific sites located along the lower Mad River between the Blue Lake Hatchery and the U.S. Highway 101 bridges, in a manner that will provide a moderate rate of recovery for the past adverse impacts of channel degradation and will eliminate or minimize the adverse impacts of future mining activities" (HCPBD 1994). The physical project location is (HCPBD 1994):

> "...in Humboldt County on the north coast of California approximately 275 miles north of San Francisco, California and 75 south of Crescent City, California. The mouth of the Mad River (river mile 0) is located at about latitude 40o58'30" North, longitude 124o07'30"West..."

This Draft SPEIR updates the number of extraction bars to 11, operated by five entities, as shown in Figures 2-1 to 2-5, and Table 2-1 (CHERT 2008, NMFS 2010). In the 1994 PEIR, 11 extraction bars were utilized by three operators, Eureka Sand and Gravel, Mad River Sand and Gravel, and Redwood Empire Aggregates.

**Figure 2-1. Lower Mad River gravel extraction sites. [Note: Larger format figures are available on request from Humboldt County Planning and Building Department]**

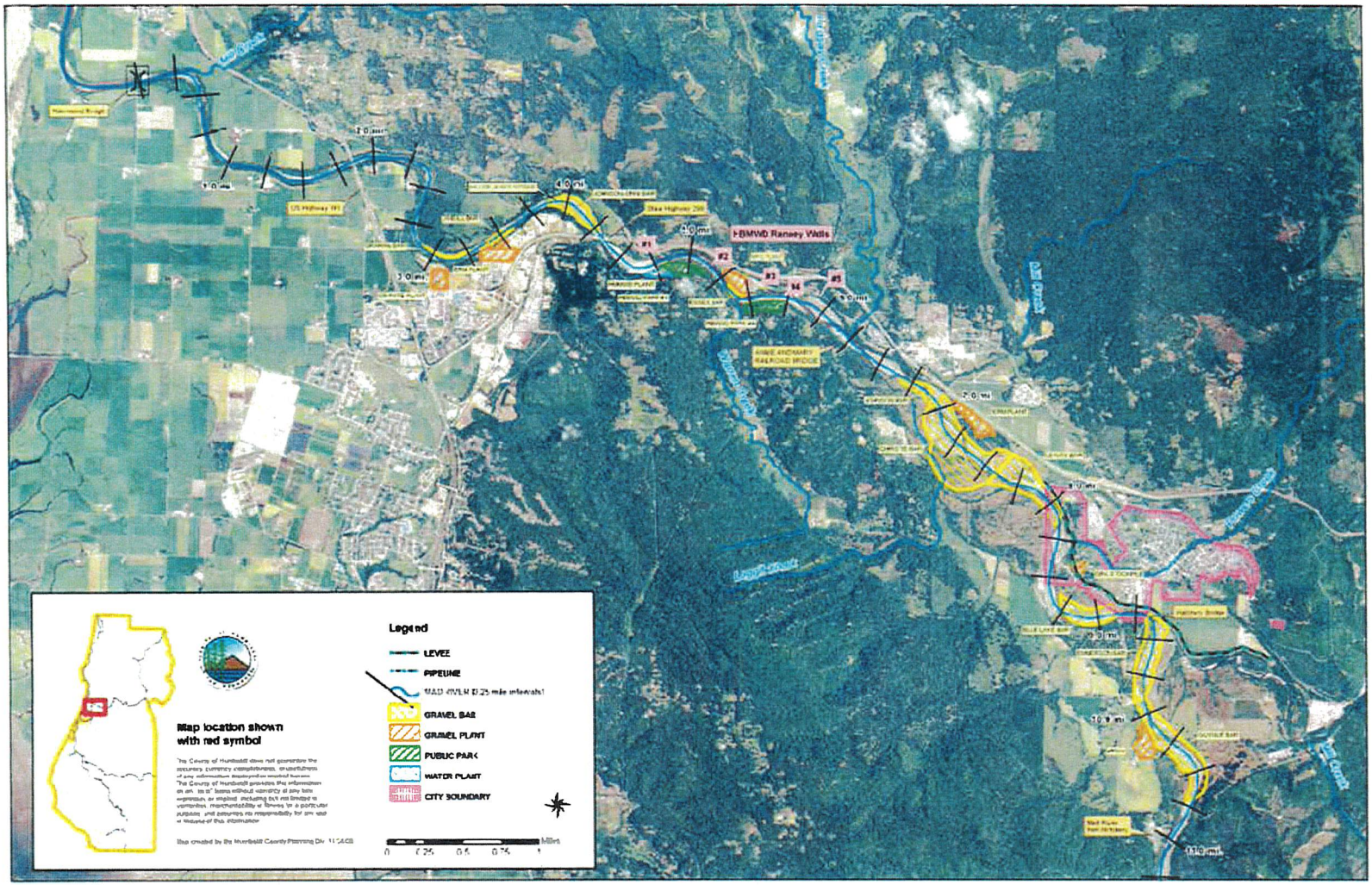

**Figure 2-2. Lower Mad River from Hammond Bridge to O'Neill Bar.**

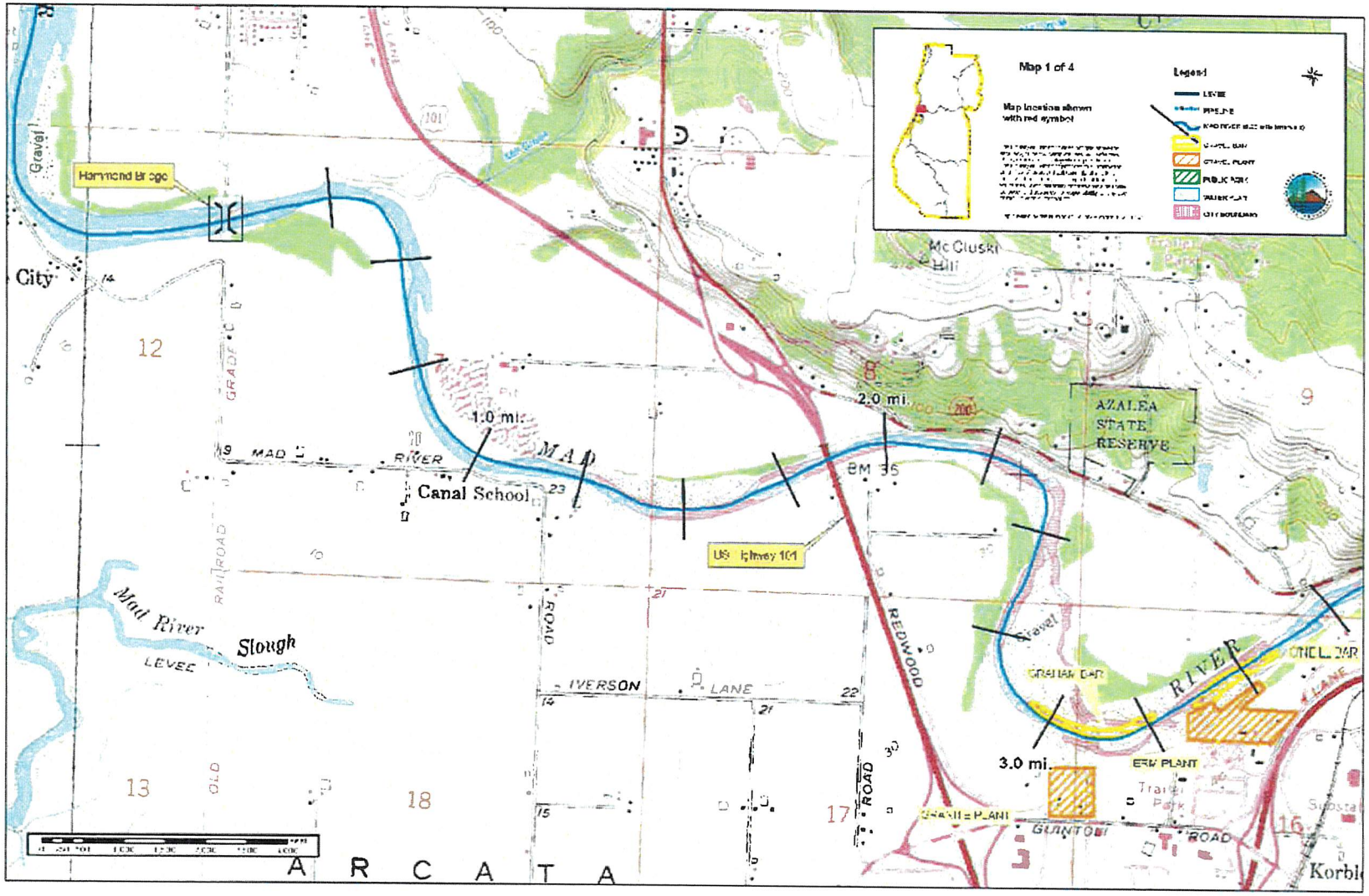

**Figure 2-3. Lower Mad River from O'Neill Bar to Christie Bar.**

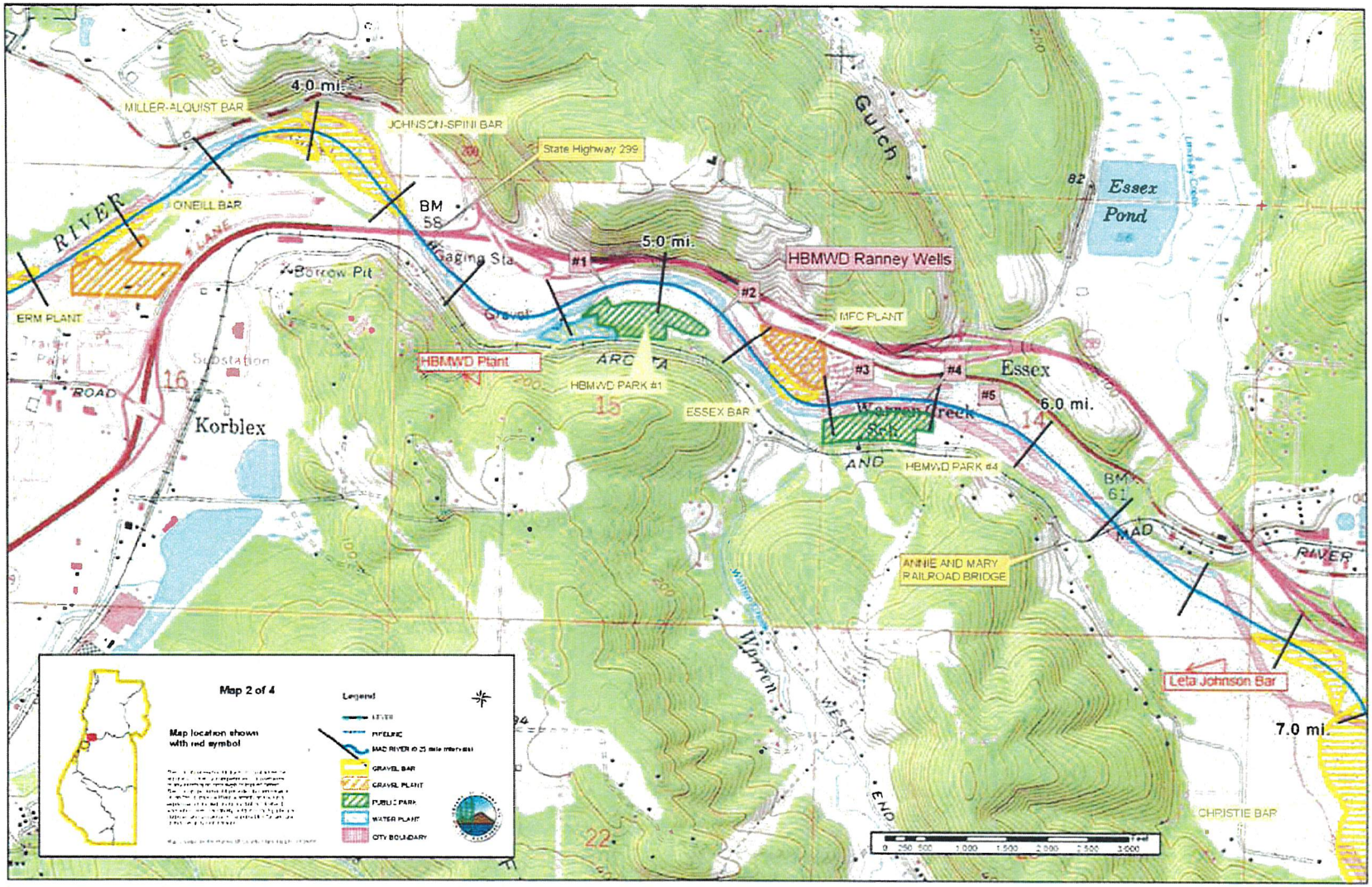

**Figure 2-4. Lower Mad River from Johnson Bar to Emmerson Bar.**

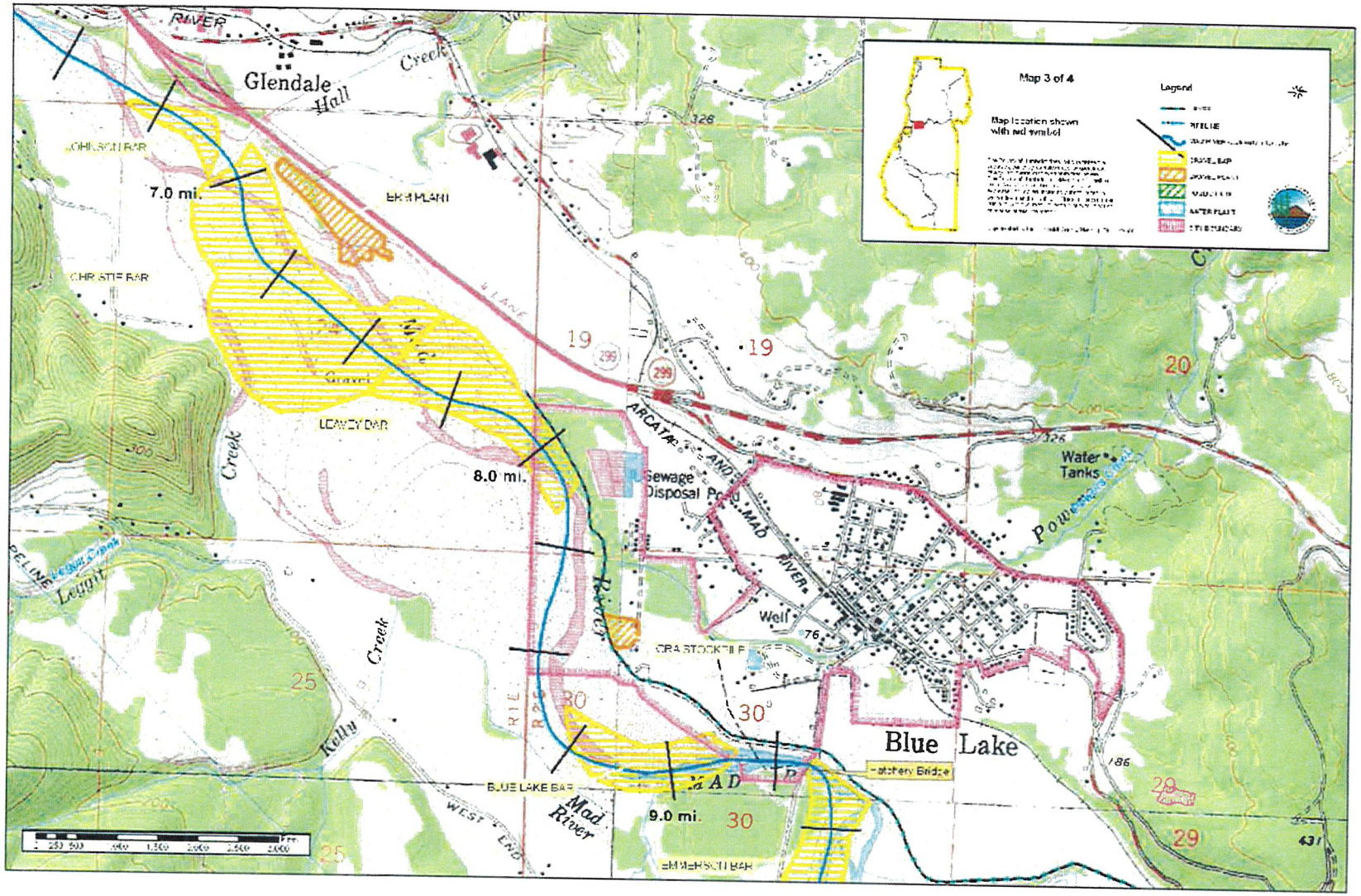

**Figure 2-5. Lower Mad River from Blue Lake Bar to Guynup Bar.**

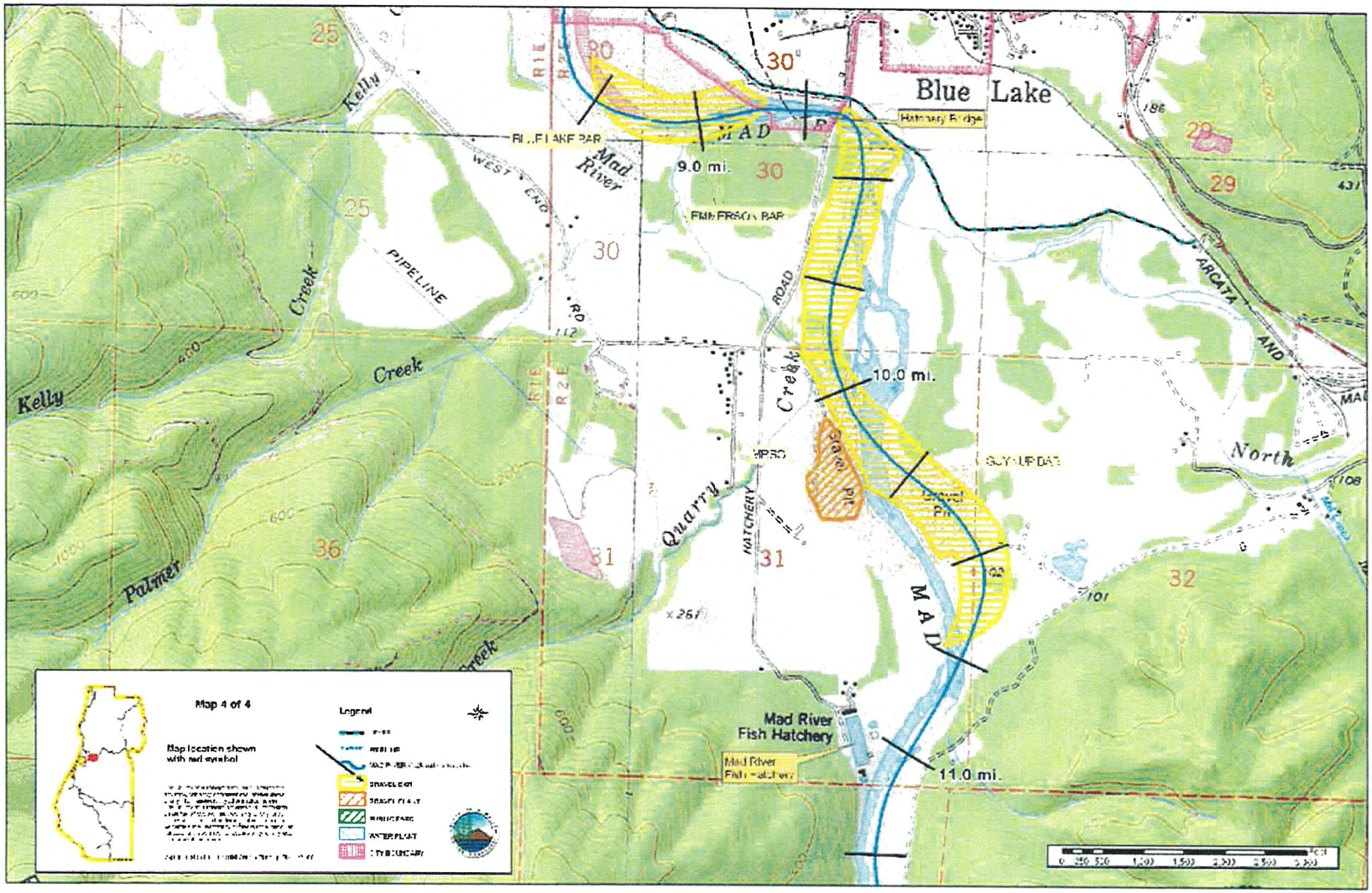

**Table 2-1. Extraction operators and sites covered in this 2012 Draft SPEIR**

| Extraction Operator | Extraction Sites, Downstream to Upstream | Approx. Location by River Mile (RM)[a] | Approx. Location by River Mile (RM)[b] |
|---|---|---|---|
| Currently inactive | Graham Bar | 2.9 | 4.2 |
| Eureka Ready Mix | O'Neill Bar | 3.3 | 5.0 |
| GR Sundberg, Inc. | Miller-Almquist Bar | 3.6 | 5.3 |
| Eureka Ready Mix | Johnson-Spini Bar | 3.9 | 5.7 |
| Mercer Fraser | Essex Bar | 5.3 | 6.9 |
| GR Sundberg, Inc. | Simpson-Glendale Bars | -- | 8.0 |
| Eureka Ready Mix | Leta Johnson Bar | 7.0 | 8.3 |
| Eureka Ready Mix | Christie Bar | 7.5 | 9.0 |
| GLJ Construction | Blue Lake Bar | 9.0 | 10.3 |
| Eureka Ready Mix | Emmerson Bar | 9.7 | 11.1 |
| Mad River Sand and Gravel | Guynup Bar | 10.4 | 12.2 |

[a] Distance upstream from Hammond Bridge (CHERT 2008)
[b] Distance from mouth (NMFS 2010)

In the 1994 PEIR and the 2009 Draft SPEIR, these operators were also listed:

- Redwood Empire Aggregates, mining on Johnson, Emmerson, Graham, and Blue Lake bars. Operator changed to Granite Construction Company.
- Arcata Ready Mix, mining on the O'Neill Bar and Johnson-Spini Bar. Operator changed to Eureka Ready Mix.
- Zabel Trucking, mining on the Simpson-Zabel Bar. This operator was cited as "unpermitted" in the 1994 Programmatic EIR, and is no longer included in the CHERT program.
- Simpson Timber Company, mining on the Upper Simpson Bar. This operator was also cited as "unpermitted" in the 1994 Programmatic EIR, and is no longer included in the CHERT program.
- Miller Family Trust, mining on the Miller-Almquist Bar.

Operator changes since the 2009 Draft SPEIR are:

- Granite Construction Company no longer operates in Humboldt County.
- Eureka Ready Mix extracts on "Leta Johnson Bar" (formerly Johnson Bar), and Emmerson Bar.
- GLJ Construction owns and extracts on Blue Lake Bar.

### 2.1.2 Methods of Extraction

CHERT classifies extraction techniques into ten categories, as summarized in Table 2-2 (CHERT 2008). Three terms must be defined to describe the extraction methods:

1. the 35% exceedence flow water surface elevation,
2. the "shoreline skim," and
3. the "offset skim."

As defined by the National Marine Fisheries Service (NMFS 2004a), the 35% exceedence flow for the Mad River is 900 cubic feet/second. The water surface elevation at that flow is staked or otherwise marked on the gravel bars each spring to define the "35% flow elevation". At the 35% flow elevation, we can anticipate that flows will be greater/higher than those staked elevations about 35% of the time on average. This criterion replaced CHERT's former skim floor datum called the "silt band", a line of light colored deposits along the low flow channel edge. The two approaches often result in nearly the same elevation.

A shoreline skim is a skim where one edge is close to the low flow channel, with extraction taking place at or above the 35% flow elevation. An offset skim is a skim that "has a substantial vertical or horizontal offset from the low flow channel" (CHERT 2008).

**Table 2-2. Description of extraction methods for instream mining (CHERT 2008)**

| Extraction Method | Definition |
|---|---|
| Narrow Shoreline Skim | A skim where one edge is close to the low flow channel at or above the 35% flow elevation with a width no greater than 1/3 the width of the unvegetated bar surface. |
| Wide Shoreline Skim | Same as above but with a width greater than 1/3 the width of the unvegetated bar surface. |
| Narrow Offset Skim[a] | A skim that has a substantial vertical or horizontal offset from the low flow channel and a width no greater than 1/3 the width of the unvegetated bar surface. |
| Wide Offset Skim[a] | Same as above, but has a width greater than 1/3 the width of the unvegetated bar surface. |
| Dry Trench | A relatively long linear shallow skim that does not intercept the water table at the time of excavation. |
| Overflow Channel Skim | Same as above but one that is located within a high flow overflow channel. |
| Wet Trench | Trench that is deep enough to intercept the water table at the time of excavation. |
| Wetland Pit | A strategically located and designed pit simulating a remnant channel feature, such as an oxbow pond. |
| Alcove | A relatively deep excavation designed to simulate naturally occurring shoreline pools that can provide cool water and/or high velocity refuge. |
| Fish Access Channel | A relatively small trench designed to temporarily improve fish access. |

[a] NMFS has referred to some of these offset skims as "horseshoe skims," however, CHERT does not use that term

In comments on the January 2009 Draft SPEIR, CDFW voiced concerns about creation of wetland pits and alcoves because they increase habitat for non-native, predatory bullfrogs (CDFG 2009a). CHERT allows wetland pits only if they are capable of drying out for a period each summer to prevent bullfrogs. This concern is discussed in the Environmental Setting and impacts analyses sections.

### 2.1.3 Timing of Extraction

In individual permits and in the July 2010 BO, timings of extraction and other activities are specified. The timing of site visits, plans, permitting, and extraction is variable, and depends on many factors including:

- Spring rainfall (late-season storms can delay data collection and mining)
- Date that operator contacts CHERT for initial site visit
- Availability of survey and cross section data
- Availability of spring and fall aerial photographs
- Number of sites that an operator chooses to mine in the year
- Whether or not an operator applies for and obtains an extension to mine past the typical cutoff date, by COE
- Amount of gravel stockpiled
- Date that post-extraction reports are available from operators

Ecologically important deadlines within the individual operators' permits and the 2010 BO have generally been met, with occasional extensions granted as per agency requirements. The following timeline in Table 2-3 reflects the timing of extraction activities in practice, given the variables listed above.

**Table 2-3. Timing of extraction activities on the Mad River**

| Time Period | Activity |
|---|---|
| Approximately May and June | Spring aerial photographs are taken of projects; aerial photos used during early site visit and pre-extraction plans. |
| May continuing through August or early September | CHERT responds to an operator's request for an early site visit. Agency representatives (including COE, CDFW, NMFS, and RWQCB) usually attend, but scheduling conflicts often require multiple visits so that all visit the site. After reviewing available data, onsite and offsite conditions and various alternatives, CHERT suggests extraction methods and locations. |
| Usually within a week or 2 of early site visit | Operator and/or their consultants submit pre-extraction plan to CHERT; if plan is similar to suggestions discussed during early site visit, approval occurs on the first submittal or with minor adjustments. |
| Usually within 2 or 3 weeks of early site visit | Operator and/or their consultants submit CHERT-approved pre-extraction plan to agencies. Agencies issue annual permits. |
| Generally no earlier than mid-June. | Extraction begins. "All extraction and reclamation activities are proposed to occur between June 1 and, on a case-by-case basis until, November 1. All temporary crossing activities are proposed to occur between June 30 and September 15 of each year, although work extensions may be granted by COE, NMFS, and CDFW on a case-by-case basis up until October 1" (NMFS 2010). |
| Mid-September through October | Fall aerial photographs taken. Sometimes photos are taken before extraction is completed. |
| October 15, based on LOP 2004-1 | Final grading of all gravel bars is completed; all extraction ceases unless a time extension is granted. |
| December 31, based on LOP 2004-1 but highly variable | Operators submit post-extraction reports to CHERT. |

| Time Period | Activity |
|---|---|
| May to June, but dependent on post-extraction report availability from all operators | CHERT completes annual post-extraction report for extraction in Humboldt County, not just on Mad River. |

### 2.1.4 Extraction Volume

Extraction volume has varied widely since extraction volumes were first recorded in the 1950s, but since 1970, extracted volume has generally decreased. An extraction volume spreadsheet was obtained from CHERT; the spreadsheet covered the period from 1952 to 2010 and readily allowed graphing of the data (Figures 2-6 and 2-7). With a few exceptions, more gravel is extracted from upstream sites than from downstream sites. Downstream sites extend from the Graham to Johnson bars; the upstream sites are from Johnson to Guynup bars; the Annie and Mary Railroad bridge is the reference point for "upstream" and "downstream" sites.

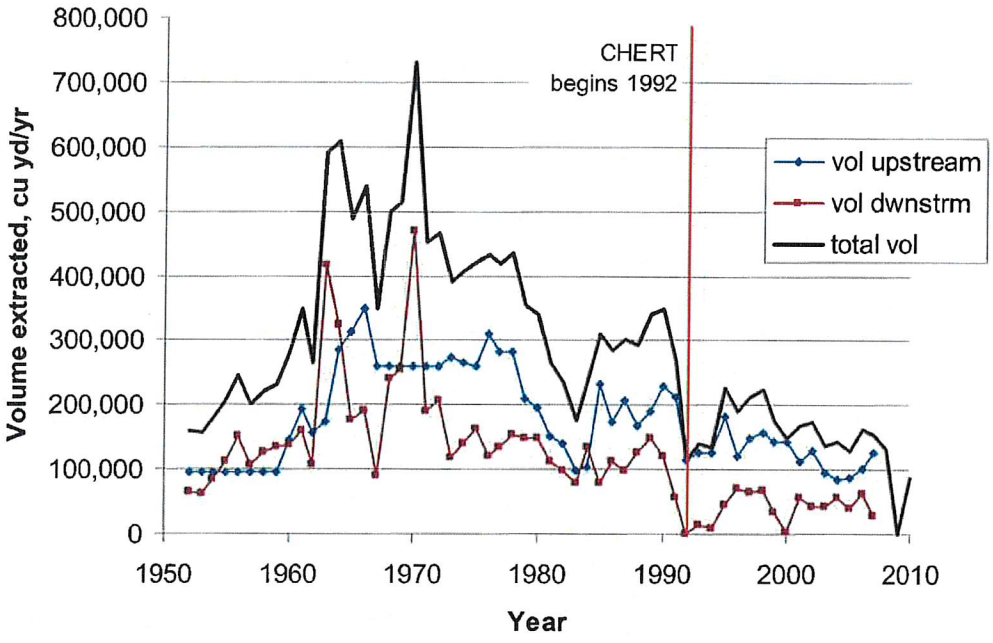


**Figure 2-6. Gravel extraction has generally decreased from 1952 to 2010 on the Mad River. "Upstream" and "downstream" volumes are separated by the Annie and Mary Bridge.**

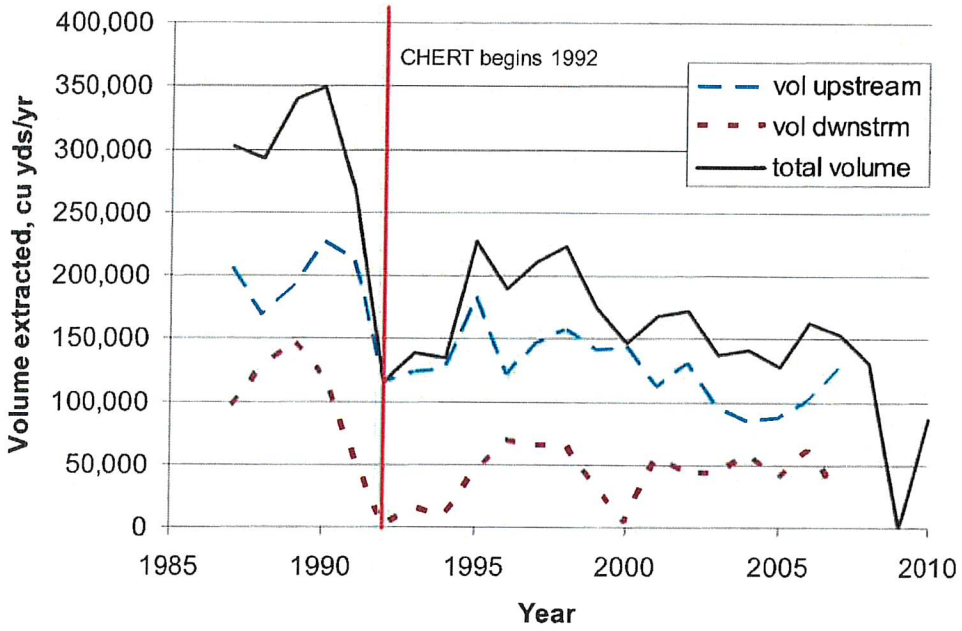


**Figure 2-7. Mad River gravel extraction has generally decreased since the CHERT program began, based on CHERT data. "Upstream" and "downstream" volumes are separated by the Annie and Mary Bridge.**

Since the CHERT program began, extraction volume has generally remained below a sustained yield volume of 175,000 $yd^3$ per year, which was set in 2004 by COE's LOP 2004-1 (Figure 2-7). Between the years 1992 and 2003, CHERT used a total extraction volume limit of approximately 200,000 $yd^3$ per year, which was based on mean annual recruitment estimates but was not a regulatory limit. More recently, NMFS has determined that allowable extraction volumes should be calculated annually (NMFS 2010).

The 2010 BO calls for "an annual extraction volume that will vary as a fraction of annual recruitment in order to align annual mining intensity with annual sediment recruitment and reverse channel enlargement in the upper reach"; this annually varying extraction volume is called the "fractional extraction volume (FEV)" (NMFS 2010). How the FEV is calculated is explained in a NMFS report that is cited within the 2010 BO. As stated in the BO, minimum and maximum extraction volumes are:

> FEV upper limit = 175,000 cubic yards on "high recruitment years"
> FEV lower limit = 72,000 cubic yards on "low recruitment years"

The FEVs are "based on recruitment estimates" and are calculated by the "FEV Calculator" spreadsheet. How the FEV is divided among the extraction operators was estimated by "the relative area of each site by first establishing an active channel area for the extraction reach based on exposed bar area on the 2009 aerial photo and then subdividing the reach into site area between the approximate upstream and downstream parcel boundaries" (NMFS 2010). Therefore, the operators' percentages of annual extraction volume are set based on 2009 conditions, as shown in Table 2-4. Three of the five operators extract gravel from more than one site; allowable extraction from each site is based on a parameter called the "disturbance ratio" (NMFS 2010).

**Table 2-4. Operators' portions of FEV and maximum extraction volumes (NMFS 2010)**

| Operator | Portion of Fractional Extraction Volume (FEV) | Maximum Extraction Volume (cubic yards) |
|---|---|---|
| Mad River Sand and Gravel | 0.192 | 33,600 |
| Granite Construction | 0.302 | 52,850 |
| Eureka Ready Mix | 0.451 | 78,900 |
| Mercer-Fraser Company | 0.019 | 3,325 |
| GR Sundberg | 0.036 | 6,300 |
| Total | 1.000 | 174,975 |

Extraction volumes will be proposed using the Mean Annual Recruitment (MAR) methods and NMFS's new FEV method. If the two methods result in recommended extraction volumes that vary widely, then the operator(s), CHERT and NMFS scientists, and the County will either 1) allow extraction to whatever volume estimate is lowest, or 2) meet and come to a consensus decision. "Vary widely" is defined as a difference large enough that operators will delay extraction in order to reach agency consensus. As stated in the BO, the FEV method will be evaluated within 5 years, which will be in 2015.

A new gravel mine site was permitted and gravel was extracted for the first time in 2011. The Blue Lake Rancheria is the operator of this site; as a sovereign nation, they are not required to obtain permits from the State or California or Humboldt County. Their mining plans are reviewed by NMFS and the COE, but CHERT does not review or receive extraction information from the Blue Lake Rancheria. According to Rancheria staff, their permit allows extraction of 20,000 $yd^3$ per year.

The volume of gravel extracted in the Mad River in 2012, not including that extracted by the Blue Lake Rancheria, is tabulated by CHERT in their 2012 Post-Extraction Report (CHERT 2013, and is summarized here:

- GLJ Construction extracted 17,054 $yd^3$ in 2012
- Eureka Ready Mix extracted 54,565 $yd^3$ in 2012
- GR Sundberg extracted 3,281 $yd^3$ in 2012
- Mercer-Fraser extracted 2,189 $yd^3$ in 2012
- Mad River Sand and Gravel extracted 23,240 $yd^3$ in 2012

### 2.1.5 Extraction and Hauling Equipment and Usage

Many types and sizes of heavy equipment are used during extraction, as summarized in Table 2-5.

**Table 2-5. Extraction and processing equipment used in operations**

| | GLJ Construction | Eureka Ready Mix | GR Sundberg | Mercer Fraser | Mad River Sand and Gravel |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Type and use of vehicles | Unknown | Haul trucks | None | 3 haul trucks, 8 hr/day, 2 weeks/yr | Referred to Kernen Construction |
| Type and use of heavy equipment | Unknown | Scraper, rubber tired loader, bulldozer, excavator | Dozer, loader, dump trucks | Scrapers, loader, haul truck, dozer, grader, water truck, excavator | Referred to Kernen Construction |
| Use of crushing and sorting equipment? | Unknown | Yes at the Christie site | No | Yes | No |
| Operation of concrete batch plant? | Unknown | Yes, at the Boyd Road site | No | No | No |
| Operation of asphalt batch plant? | Unknown | No | No | No | Referred to Kernen Construction |
| Source of information | 2nd email request on 8/29/12, 3rd mail request on 3/4/13 | Email from Paul Krause, 8/16/12. | Email from Randy Sundberg, 8/16/12 | Emails from Mark Benzinger, 8/15/12 and 8/29/12 | Form returned 3/20/2013 |

In the 1994 PEIR, traffic associated with gravel extraction was defined as that which transported:

- Equipment to and from extraction sites
- Raw material to stockpile areas
- Stockpiled material to processing yards
- Raw material to job sites
- Processed material to job sites
- Employees from extraction to processing to job sites

The service area for the operations in 1994 was described as from Eureka to Orick, and east to Willow Creek, for an approximate 50-mile radius.

In an attempt to estimate the maximum volume of diesel fuel used by extraction equipment, trucks, and vehicles associated with gravel extraction, the operators were asked how much diesel would be needed to extract a volume equal to their operation's maximum, based on sustained yield extraction, and assuming a 50-mile job site for all of the gravel. This estimate would be an over-estimate of volume of diesel used because the maximum volume of gravel has not been extracted recently, and because not all job sites would be 50 mi away. Estimated diesel use varies from 250 gallons to approximately 72,000 gallons; Paul Krause of Eureka Ready Mix included diesel used to extract from the gravel bar, process the gravel, deliver the rock and ready mix concrete, transport waste concrete and recyclable materials, and employees on site transit.

**Table 2-6. Diesel fuel usage estimates**

| | GLJ Construction | Eureka Ready Mix | GR Sundberg | Mercer Fraser | Mad River Sand and Gravel |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Maximum Extraction Volume (cubic yards) (NMFS 2010) | 52,850[a] | 78,900 | 6,300 | 3,325 | 33,600 |
| Approximate fuel usage | Unknown | 72,034 gallons for 2012 Christie, Leta Johnson, Johnson-Spini, and Onelll bars | 500 gallons diesel | 250 gallons diesel | Refer to Kernen Construction |
| Source of information | 2nd email request on 8/29/12, 3rd mail request on 3/4/13 | Letter from Paul Krause, 2/27/13 | Returned form from Randy Sundberg 3/6/13 | Emails from Mark Benzinger, 8/15/12 and 8/29/12 | Form returned 3/20/2013 |

[a] This volume was that allotted to Granite Construction by NMFS (2010).

### 2.1.6 Extraction Design and Habitat Enhancement and Protection

Activities to enhance and protect habitat are described in individual permits and the July 2010 BO. This section describes 1) pre- and post-extraction activities that are designed to enhance and protect habitat, as described in pre-2011 individual permits and a 2004 BO, and 2) new extraction requirements specified in the 2010 BO.

#### 2.1.6.1 Extraction Design and Habitat Enhancement Procedures under Pre-2011 Individual Permits

Spring aerial photos must show mine areas and also cover "adjacent riparian corridor" along with annual operations areas, bankfull channel, and project reach limits. The project reach is defined as the stream length subject to potential extraction plus one-half of this length, up- and downstream of the reach. Site features such as haul roads, extraction areas, and proposed crossings should be clearly shown.

The spring aerial photos are used in the annual pre-extraction plans, which should include:

- Scaled aerial photographs
- Extraction designs and cross sections
- Volume calculations
- Monitoring cross sections
- Proposed road and bridge locations
- Narrative describing extraction methods, and any other operational activities such as stockpiling, changes in haul roads, etc.
- Copies of biologic or hydrologic reports or reviews that support alternative extraction designs
- Any other documentation that supports extraction design

Operators have developed a decision matrix to help identify extraction methods that attempt to minimize effects on habitat. According to NMFS (2010), "the matrix provides guidance for selection of appropriate extraction methods in relation to effects minimization and goals." The matrix includes criteria for salmonid

habitat; other criteria include cost to extract and replenishment potential. CHERT often relies on wetland pits, alcoves, overflow channel skims, and dry trenches to minimize effects on habitat; however, future use of wetland pits and alcoves is discussed in greater detail in Section 4.2.3.4 because these features could increase habitat for the non-native and predatory bullfrog.

The purposes of the pre-extraction plans and reviews are 1) to describe extraction volumes, locations, and methods so they may be understood and evaluated during field reviews, 2) to modify the plans as needed to assist operators in reaching habitat protection goals, and 3) to provide documentation so that pre-extraction conditions can be compared with post-extraction conditions, evaluating how closely approved plans were implemented.

The pre-extraction plans should also depict and quantify areas of vegetation disturbance, and should include narrative descriptions of additional mitigations if any are planned. In previous LOPs (LOP 96-1) and in Humboldt County's interim monitoring and adaptive management guidelines, riparian vegetation types were to be described every three years, in and nearby extraction sites (NRM 2000a).

Within the 2004 BOs (NMFS 2004a, 2004b), measures for protecting riparian vegetation included:

- Avoiding disturbance "to the maximum extent possible"
- Mitigation and monitoring of "Qualifying Vegetation", which is woody vegetation that is part of a contiguous 1/16 acre complex or greater, or that is at least 2-inches in diameter at breast height. Mitigation is not required for impacts due to maintenance of existing haul roads or brushing of survey monitoring lines related to extraction.
- Retention of Large Woody Debris (LWD) for redistribution in appropriate locations
- Maintenance of a 10-ft minimum buffer between extraction and the canopy edge of mature riparian vegetation. Where patches are present, a minimum 5-ft buffer is required in up- and downstream directions. The dimensions and slopes of these buffers, which taper up- and downstream, are in the BOs.
- A preference or order in which to undertake riparian vegetation protection:

    1. Avoiding riparian vegetation by adjusting extraction boundaries
    2. Transplanting vegetation to alternative areas
    3. Providing mitigation and monitoring for direct loss of "Qualifying Vegetation"

Hauling and access roads have the potential to create impacts, but mitigation measures can be implemented. On existing haul roads, periodic grading is allowed but dust must be abated; this is generally accomplished by watering the haul roads. For new haul roads that would affect vegetation, compensatory mitigation and agency approval is required. Operators will restrict unauthorized vehicle access to riparian habitat and river channels to the maximum extent practicable to reduce habitat degradation, large woody debris removal, and illegal refuse dumping. (See activities covered under SMARA reclamation plans, Section 2.2.1; a trespass management plan shall be submitted to the Humboldt County Planning & Building Department and CDFW for review and approval.)

Gravel can be temporarily stockpiled on the bars, but storage must be temporary and must have been approved in the annual pre-extraction plan. Temporary gravel stockpiles must be located "away" from the wetted channel and removed prior to October 1st.

Post-extraction reviews are performed to evaluate operator performance in meeting approved plans and to "assess the site for additional end-of-season reclamation and recommend minor grading to ensure site drainage" (NMFS 2004a). Post-extraction aerial photographs are taken to verify compliance, map biological resources, and assess riparian vegetation units.

Post-extraction data and biological monitoring reports are to be submitted to COE and CHERT by Jan 15th of each year. The post-extraction reports should include 1) "consideration of new mining protocols or mitigation measures to further protect the riparian environment," (NMFS 2004a), 2) copies of biological reports for the year, 3) mitigation reports.

#### 2.1.6.2 Extraction Design and Habitat Enhancement Procedures under the 2010 BO

Although the 2010 NMFS method for estimating extraction volume is a departure from previous methods, the 2010 NMFS extraction designs and methods are relatively similar to previous designs and methods. Some additional requirements for gravel extraction were imposed in the 2010 BO. These additional requirements include:

1. Tracking the number of temporary bridge or channel crossings
2. Instream habitat typing of pools, riffles, flatwaters, and alcoves
3. Field surveying of salmonid habitat (age 2+ steelhead, juvenile coho, adult holding and spawning) and delineating the habitat on aerial photographs
4. Determining riffle crest and residual pool depths
5. Reviewing extraction volume and designs at a 5-year "check in period"
6. Annual planning and implementing of salmonid habitat improvement projects

Although the 2010 BO does not explicitly specify the frequency of these additional requirements, the likely intended frequency for requirements 1 to 4 above is annually.

The salmonid habitat improvement planning process further requires a number of steps (NMFS 2010):

1. Assessment of enhancement needs within the extraction reach,
2. Identification of appropriate and practical improvement projects,
3. Selection and prioritization of site specific projects within the "extraction reach-scale area"
4. Biological monitoring
5. Formation of a Project Team
6. Identification of funding sources

Three operators have proposed specific habitat improvement projects, as identified in Table 2-6 (NMFS 2010, Krause 2012).

**Table 2-6. Site specific habitat improvement projects by operator (NMFS 2010, Krause 2012)**

| Operator | Nature of the Habitat Improvement Projects |
|---|---|
| Mad River Sand and Gravel | • Limiting unauthorized firewood cutting, off-road vehicle use, and poaching<br>• Improving salmonid access to Quarry Creek, after culvert is replaced |
| Granite Construction[1] | • Limiting unauthorized firewood cutting, off-road vehicle use, and poaching |

| Operator | Nature of the Habitat Improvement Projects |
|---|---|
| Eureka Ready Mix | • Installing log and boulder groins at upstream end of Blue Lake bar; planting downstream of groins<br>• Installing log/boulder structures where conditions warrant, at approximately 3 structures over 5 years<br>• Limiting unauthorized firewood cutting, off-road vehicle use, and poaching<br>• Extracting via "small wet alcoves" at Johnson-Spini, Christie, and Emmerson bars<br>• Placing cut vegetation to improve salmonid survival<br>• Connecting tributary mouths to the low-flow channel<br>• Placing LWD structures<br>• Working with CDFW on bullfrog eradication at Emmerson bar<br>• Improving habitat along Leggit Creek at Christie bar<br>• Annual surveying of fisheries habitat |

[1] Granite Construction no longer operates within Humboldt County

### 2.1.7 Limitations on Excavation Purpose

The pre-extraction and post-extraction plans describe gravel removal for extraction purposes only. "No authorization will be granted under a LOP for any excavation or grading that is for the primary purpose of river engineering, channel or river capture, channel realignment or for a project that is likely to result in the above, unless approved by COE" (NMFS 2004a). In other words, the CHERT-recommended pre-extraction plans describe actions that minimize habitat effects; these actions may also be associated with channel realignment or aggradation/degradation, but CHERT is limited so that it does not suggest extraction methods for river engineering purposes (e.g., channel realignment).

## 2.2 Description of CHERT Adaptive Management Program

An important part of the Proposed Project is the CHERT adaptive management program, which was identified as mitigation measure "Mit-1" in the 1994 PEIR. The phrase "CHERT adaptive management program" refers to the entire administrative and technical process of managing gravel resources on the lower Mad River, which includes seven primary stakeholders (Figure 2-8). Therefore, the Proposed Project covers activities of these stakeholders: gravel operators; the public; elected officials; the CHERT team itself; and federal, state, and local resource agencies. An important distinction is the difference between the CHERT team[3] (the team currently consisting of four scientists) and the CHERT adaptive management program (the organization and process that the stakeholders recognize for the purpose of managing gravel resources and avoiding/mitigating habitat impacts).

Descriptions of the CHERT adaptive management program's objectives, its formation and administration, its technical and environmental activities, and its funding mechanism, follow. Details describing the CHERT team are also provided.

In comments on the January 2009 Draft SPEIR, NMFS staff stated that resource agencies are outside of the County's jurisdiction, and so the Proposed Project description should be reworded to reflect that fact. This comment is noted, however, the resource agencies are an integral part of the CHERT adaptive management program, and to understand the program, the agencies' activities are described. Description of their activities in this document does not imply that agencies are within the County's jurisdiction.

[3] The 1994 PEIR specified the number of CHERT members as five.

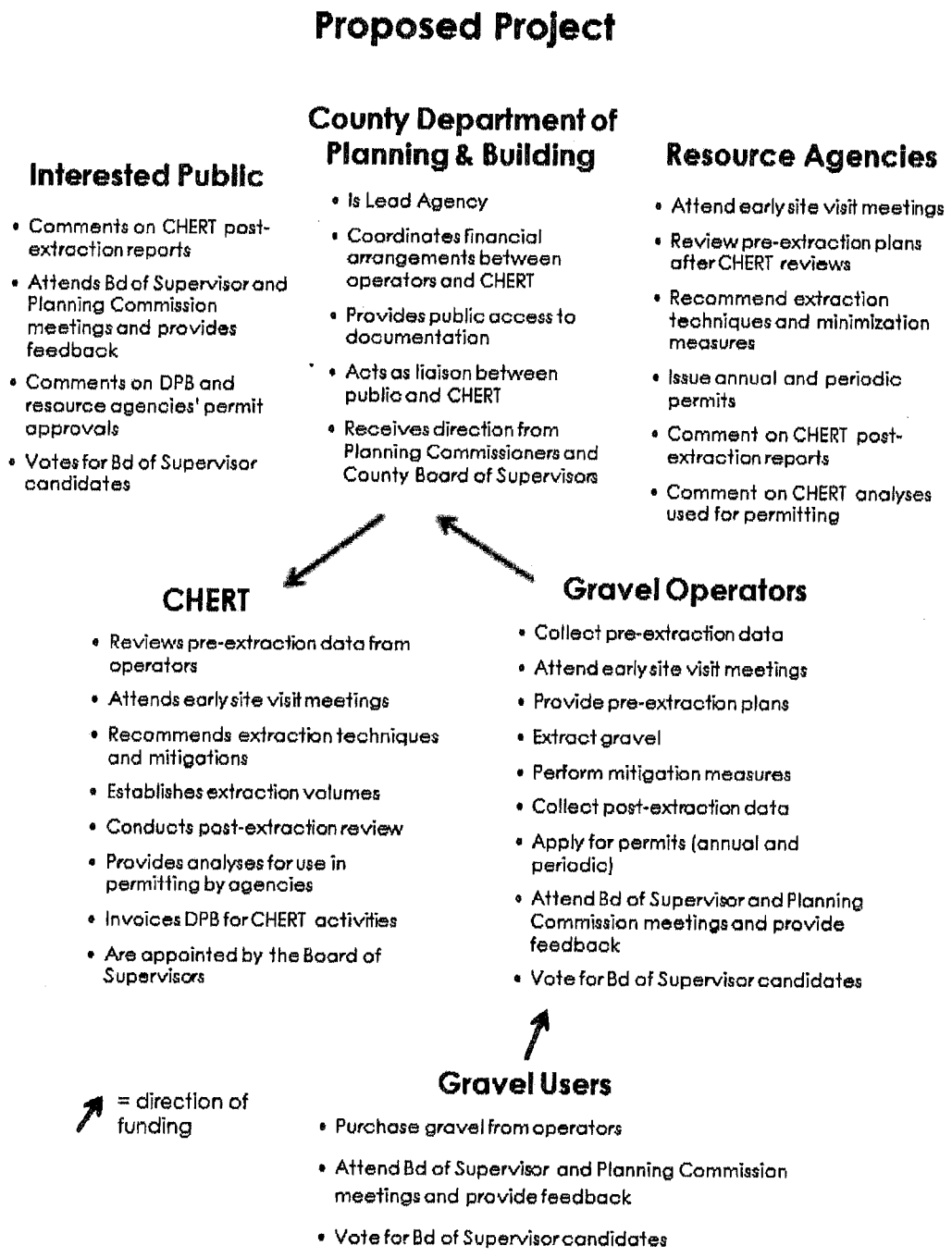


**Figure 2-8. This flowchart describes the duties of the participants of the CHERT adaptive management program, and the flow of funds under the Proposed Project.**

### Objectives and Scope of the CHERT Adaptive Management Program

The objectives of the CHERT adaptive management program are to:

- Provide independent scientific and technical review of gravel extraction proposals for permitted, vested, or exempted extraction operations that are identified in PEIRs for in-stream gravel extraction within the County. (Note: a few CHERT-reviewed operations are not covered in the programmatic EIRs for either the Mad or Eel and Van Duzen rivers.) The review will assess "annual changes in site conditions... to reduce impacts to listed species and designated critical habitat," as required in the COE's LOPs and individual permits with gravel operators (HCDCDS 2008).
- Define and quantify the mean annual recruitment of in-stream gravel, and to provide "annual in-stream gravel extraction prescriptions...based on a management strategy that does not result in exceeding the mean annual recruitment of a river segment" (HCDCDS 2008). (Note: CHERT's mean annual recruitment volume is not the same as NMFS's Fractional Extraction Volume or FEV.)
- "Protect river form and function, while recommending extraction quantities that are within the estimated long-term average annual sustained yield amount for a specific river" (HCDCDS 2008).

Analyzing the effects of gravel extraction is explicitly described in the above objectives of the CHERT adaptive management program. From the 2007 NOP, one of the CHERT program's objectives is to "reduce impacts to listed species and designated critical habitat." From the July 2008 Humboldt County General Plan Update, the effects of gravel extraction are analyzed when the CHERT program "protect[s] river form and function..." Therefore, because this Draft Supplemental PEIR evaluates the effectiveness of the CHERT program, it also analyzes the effects of gravel extraction.

Comments from resource agencies indicated that stockpiling and processing activities should be reviewed by CHERT, where these activities affect riparian habitat and wildlife. The 1994 PEIR addressed potential effects of stockpiling and processing (see impact Wild-1 and mitigation measure Mit-1 on page 100 of the 1994 PEIR), however, stockpiling and processing activities were not explicitly covered under the section "General Duties of the SDRC" (page 198 of the 1994 PEIR). This Draft SPEIR clarifies that stockpiling and processing activities will be reviewed by CHERT, where these activities affect riparian habitat and wildlife.

The CHERT team reviews pre-extraction plans but does not review the SMARA reclamation plans that allow operators to obtain a permit from the California Department of Conservation (through the Humboldt County Planning and Building Department). The activities that are covered under a pre-extraction plan versus a reclamation plan are not well defined, but generally activities that occur over the long-term (say, more than 10 to 15 years) are best permitted through the reclamation plans. Examples of descriptions that would be best addressed in reclamation plans include:

- Locations of processing plants and stockpiles
- Activities and structures that limit road use by the public (e.g., a trespass management plan)

However, as stated above, stockpiling and processing activities will be reviewed by CHERT, where these activities affect riparian habitat and wildlife.

## 2.2.1 Formation and Administration of CHERT Program

The CHERT adaptive management program (or "CHERT program") was established pursuant to the 1992 "Memorandum of Agreement" and the 1994 "Programmatic Environmental Impact Report on Gravel

Removal from the Lower Mad River", which was certified by the Humboldt County Board of Supervisors on May 31, 1994. Six primary stakeholders have become identifiable over the years since the program was initiated; they are:

1. Humboldt County Planning & Building Department, and the Humboldt County Planning Commission
2. CHERT team
3. Resource agencies including the California Department of Conservation, CDFW, COE, the National Marine Fisheries Service, the North Coast Regional Water Quality Control Board (RWQCB), and the North Coast Unified Air Quality Management District
4. Gravel operators and their consultants or representatives
5. Gravel users
6. Interested public including landowners adjacent to extraction sites and environmental organizations

The primary activities performed by each stakeholder group under the Proposed Project are listed in Figure 2-8.. Information flow between stakeholders is frequently "2-way." But CHERT does not interact directly with, for example, the North Coast Unified Air Quality Management District because air quality issues are generally outside of CHERT's scope of work. Noise is another potential impact that is generally outside of CHERT's scope of work. If during SMARA inspections or through communication with other stakeholders, County staff became aware of either air quality or noise conditions that affect biological factors, County staff would contact CHERT members to determine if any of the recommendations made by CHERT could address air quality or noise effects.

As in any natural resources adaptive management program, the public is an important and necessary stakeholder. In the CHERT adaptive management program on the lower Mad River, the interested public is generally represented by two groups 1) environmental non-governmental organizations such as the Northcoast Environmental Center, the Mad River Alliance, and CalTrout, and 2) individual landowners and landowner groups, such as Friends of Small Places. As evidenced by comments on the NOP for the 2009 Draft SPEIR, some members of the interested public are technically well-informed on gravel extraction.

The gravel operators and their consultants play an integral and important part in the adaptive management program. Besides providing a needed resource to gravel users, the operators are responsible for collecting pre- and post-extraction topographic data, providing semi-annual aerial photography, and performing any required restoration or mitigation measures.

With the annual extraction cap of 175,000 cubic yards (or less depending on the year's FEV calculation), a new operator could only enter into the CHERT program by arranging to purchase, lease, or otherwise financially compensate an existing operator for the latter's extraction rights. Permits for new and additional operators are unlikely to be issued because the existing operators' permits and vested rights exceed the sustained maximum annual recruitment. If new sites and operators were to be permitted, the County Planning & Building Department may determine that impacts previously evaluated, such as traffic, noise, or aesthetics, would need to be re-evaluated. Regardless of potential shifts in ownership, CHERT recommendations would still focus on minimizing environmental effects to riparian and aquatic biological resources.

### 2.2.2 Formation and Administration of CHERT Team

Within this adaptive management framework, the CHERT team consists of at least three but no more than five[4] members with expertise in hydrology, fluvial geomorphology, fisheries, and river ecology. CHERT team members are appointed by the Humboldt County Board of Supervisors and serve as agents of the County. CHERT team activities are primarily technical and scientific; team administrative duties are maintained at a minimum level.

Currently, the four CHERT members, their specialties, and their affiliations are:

- Doug Jager, B.S., M.S., forestry; Ph.D, hydrology, Humboldt State University professor *emeritus*, Forestry and Watershed Management Department, private consultant
- Randy Klein, MS, hydrology, Redwood National Park and private consultant
- Andre Lehre, Ph.D, geology and geomorphology, Humboldt State University professor, Geology Department, private consultant
- Bill Trush, Ph.D, river ecology and fisheries biology, private consultant, Humboldt State University adjunct professor, Environmental Sciences and Management Department

They were appointed in 1992 by the Humboldt County Board of Supervisors. At that time, the Board of Supervisors consisted of:

- Stan Dixon, District 1
- Roy Heider, District 2
- Julie Fulkerson, District 3
- Bonnie Neely, District 4
- Anna Sparks, District 5

Of the original CHERT members appointed in 1992, four continue to serve. For several years, a fifth member also served on CHERT: Karen Thiess, a wetlands and riparian vegetation specialist. She became ill and resigned from CHERT before her death. Since that time, the CHERT team has subcontracted to local vegetation consultants on an "as needed" basis.

CHERT team members are appointed by, and serve at the pleasure of, the Humboldt County Board of Supervisors. No term limit was set in the 1994 PEIR nor is one proposed now. All activities of the CHERT team are performed in accordance with the provisions of the California Government Code governing conflicts of interest, including Section 87000 et seq., and the Public Resources Code, Division 2, Chapter 9, Section 2774. Accordingly, CHERT members annually file "Statements of Economic Interest Form 700" with the State. Because CHERT members serve at the pleasure of the Board, they may be excused by the Board at any time.

### 2.2.3 Technical and Environmental Activities of CHERT Program

How annual extraction volumes have been set has been developing over time. Beginning in 1992, the CHERT team annually determined the extraction volume appropriate for each site, based on local conditions, with a goal of keeping the reach-wide volume to sustainable limits as estimated during that time. In 1996, the

[4] The 1994 PEIR specified the number of CHERT members as five.

gravel operators petitioned the Board of Supervisors to be allowed to take more than the CHERT-recommended limit that year. A compromise was arrived at during the hearing, applicable to that year only. In 2004, an annual maximum Mad River extraction cap of 175,000 $yd^3$ was set by COE's LOP and individual permits. Each operator is allocated a fixed proportion of the annual cap. "This determination is dependent upon reclamation, net recruitment, potential bank erosion, individual bar replenishment, individual bar morphology, as well as all other pertinent river conditions, resources, and trends that ... [are] deemed relevant by CHERT" (HCDCDS 2008). Now, with the agency-imposed 175,000 $yd^3$/year cap and NMFS's annual FEV estimated, the operators could still petition the Board for a higher amount, but the ensuing conflicts with federal agencies would make this more problematic.

The CHERT team is responsible for reviewing pre-excavation plans for permitted operations identified in this Draft SPEIR. CHERT reviews operations to determine whether data are being collected according to specified standards, and whether the data are useful in describing river morphological processes and potential extraction effects. CHERT annually reviews the operators' pre-excavation plans and provides technical comments that may result in revisions. When technical issues have been resolved, CHERT recommends approval of the operators' extraction plans to the regulatory agencies, who then either grant approval or request more information or modification.

After each extraction season, the CHERT team, regulatory agency staff, the operators, and operators' representatives conduct field inspections of extraction sites and discuss site conditions and reclamation activities. The CHERT team summarizes its findings in annual post-extraction review reports. The reports are submitted to the County Department of Planning & Building, and County staff posts the reports on the County's website. Reports include post-extraction observations and designed vs. actual extraction volumes, as well as historical volumes by river reach.

The comment period on the post-extraction reports is 30 days. After the comment period closes, County staff relay the comments to the CHERT team, who address and respond to the comments and correct any errors in the draft.

None of the current CHERT team members are licensed engineers or registered geologists. However, the pre- and post-extraction surveys and volume calculations are prepared by licensed engineers, licensed surveyors, or registered geologists, as required by the operators' individual permits.

Although staff of the County's SMARA program annually inspect and review the sites and reports, CHERT does not include SMARA-specific information in its post-extraction plans. That information is prepared by County staff as described in Section 2.2.1.

A number of CHERT and SMARA related documents are currently online on the Humboldt County Planning & Building Department website[5]. The online documents specific to extraction on the Lower Mad River include:

- Letter of Permission Procedure (2004-1) For Gravel Mining And Extraction Activities Within Humboldt County, and its three previous versions
- Resolution 96-37 establishing CHERT
- 1994 Final PEIR and its appendices and figures

[5] As of March 1, 2011, the URL is http://co.humboldt.ca.us/planning/smara/default.asp?inc=slm

- CHERT annual post-extraction reports
- CHERT summary (multi-year) reports
- 1994 Programmatic EIR
- January 2009 Draft Supplemental Programmatic EIR
- Technical reports that support programmatic EIRs

Resource agencies that utilize the CHERT team's analyses and recommendations include CDFW, National Marine Fisheries Service, COE, Humboldt Bay Municipal Water District, California Coastal Commission, Caltrans, and the County Public Works Department. Although the CHERT adaptive management program manages resource extraction that could cause adverse impacts to infrastructure such as levees, bridges, and the water district facilities, the "limitations on excavation purpose" preclude the CHERT team from recommending any extraction for the purpose of river engineering (see Section 2.1.7). COE requires CHERT's review and recommendations in the operators' individual permits. CDFW's streambed alteration agreements also require CHERT's review and recommendation.

#### 2.2.3.1 Changes in Technical and Environmental CHERT Activities since 1994 PEIR

Twenty-four mitigation measures were described in the 1994 PEIR. The following six mitigation measures (with brief descriptions) are under the direct control of CHERT:

Mit-1. The CHERT adaptive management program will be established.
Mit-3. CHERT will monitor river banks, and where feasible, will initiate bank stabilization practices where bank erosion is excessive.
Mit-4. CHERT will consult with operators for design and location of summer bridges.
Mit-6. CHERT and CDFW will monitor fish spawning and how it may be affected by extraction.
Mit-7. CHERT will continue wildlife monitoring surveys for at least five years (until at least 1999) and will consider the surveys when developing annual mining strategies.
Mit-24. CHERT will strive to locate sites where revegetation can be used to compensate for visual, vegetation, and terrace forming qualities lost due to extraction-induced barren bars.

CHERT implemented five of these six mitigation measures. Mit-7 was not completed by CHERT. CHERT scientists believe that annual wildlife surveys would not detect the impact of gravel extraction on wildlife because numerous land uses and environmental conditions unrelated to gravel extraction could cause wildlife to decrease or increase. Therefore, CHERT scientists, as part of the adaptive management program, propose to change annual wildlife surveys into monitoring riparian and aquatic habitat. In 2008, CHERT scientists monitored riparian and aquatic habitat, and analyzed trends in both. In the future, riparian and aquatic habitat is proposed to be surveyed using a methodology similar to Stillwater Sciences (2008) or Trush (2008a), and that fulfills NMFS (2010) requirements (see below).

As part of operators' requirements under their 2010 Biological Opinion, operators will perform the following monitoring and planning actions (NMFS 2010):

1. tracking the number of temporary bridge or channel crossings,
2. instream habitat typing of pools, riffles, flatwaters, and alcoves,
3. field surveying of salmonid habitat (age 2+ steelhead, juvenile coho, adult holding and spawning) and delineating the habitat on aerial photographs,
4. determining riffle crest and residual pool depths,
5. reviewing extraction volume and designs at a 5-year "check in period", and

6. annual planning and implementing salmonid habitat improvement projects.

Instead of allowing wetland pits to be constructed as in the 1994 PEIR, operators will not create habitat supportive of bullfrogs or red legged frogs (such as wetland pits) until a lower Mad River bullfrog and red legged frog study is conducted. The study will be performed by CHERT and CDFW, and will identify and determine whether additional extraction technique guidelines (such as the timings, locations, and depths of extraction pits and alcoves) could be developed, to favor red-legged frogs and suppress bullfrogs. Also, a river-wide bullfrog suppression plan, supported by all land owners, lessors, and operators who allow nearby and immediately adjacent ponds, is recommended, because these ponds are local sources of adult bullfrogs in the lower Mad River corridor. This suppression plan should: (1) identify source populations, (2) better quantify life history periodicity, habitat requirements, and adult movements, (3) define what an acceptable level of bullfrog suppression should be and how it would be measured, and (4) help develop guidelines for excavating gravel within the Mad River's floodplain and terraces.

Comments from resource agencies indicated that a riparian vegetation specialist should be more closely involved with the CHERT adaptive management process. This Draft SPEIR clarifies when a riparian vegetation specialist is needed, by listing the specialist's responsibilities and tasks:

- Define "desired riparian conditions and vision" (CDFG 2009a)
- Assist in extraction plan review by evaluating extraction prescriptions that minimize annual disturbance or that have riparian enhancement potential, riparian impacts, and progress on riparian recovery and enhancement projects
- Contribute to CHERT post-extraction reports by summarizing riparian conditions and recommending any activities for improvement or additional work
- Assist in design and monitoring of: 1) any riparian mitigation, recovery, or enhancement projects associated with gravel extraction, and 2) long-term riparian efforts associated with the CHERT adaptive management program

Within five years of certification of this Supplemental PEIR, the riparian specialist shall work with CDFW and individual mining operators to develop site specific and practicable recommendations for riparian protection, enhancement and recovery plans associated with upland stockpiling and processing operations.

### 2.2.4 Funding Mechanism of the CHERT Program

The CHERT adaptive management program activities are ultimately funded by the gravel operators, but CHERT team members and subcontractors are paid by the Humboldt County Planning & Building Department, as indicated in Table 2-7. Gravel operators pay fees to Humboldt County and Humboldt County uses those funds to pay CHERT members. CHERT may subcontract if expertise is required that they cannot provide; the subcontractors are also paid by Humboldt County. Current CHERT members do not perform CHERT-related services on a full-time basis.

The financial compensation of the CHERT members is below market rates, again as shown in Table 2-7. Based on 2009 data from the US Department of Labor, Bureau of Statistics, CHERT member compensation is 47% to 66% less than the compensation usually received by senior-level geologists, hydrologists, and biological scientists. Based on an informal survey of consulting firms in the Humboldt County area, CHERT member compensation is approximately 23% to 66% less than consulting market rates.

**Table 2-7. CHERT member and subcontractor wages compared to US Department of Labor 2007 data**

| Hourly Rate that CHERT Charges Humboldt County, 2013 | US Department of Labor, Bureau of Statistics, 2009[a] | | Humboldt County Consulting Firms' Charge Out Rates for Senior-Level Scientists and Environmental Engineers |
|---|---|---|---|
| | Wage, $ per Hour | Hourly Rate Assuming 3.0 Multiplier, $ per Hour | |
| CHERT scientists $85 | $53 to 78 | $159 to $234 | $150 to $250 |
| CHERT subcontractor $130 | $46 | $138 | $130 |

[a] USBLS 2009. Multiplier accounts for taxes, health insurance, retirement benefits, and all other overhead such as office space and telecommunications

The steps for CHERT team compensation are:

1. CHERT members perform related activities and record their hours on time sheets.
2. Each quarter, CHERT uses the time sheets to determine how much each member will be paid and how the various individual operators will share the member charges.
3. CHERT submits this information in a quarterly invoice to the Humboldt County Planning & Building Department.
4. The Humboldt County Planning & Building Department pays CHERT members and subcontractors, if any.
5. Gravel extraction operators reimburse the Humboldt County Planning & Building Department based on invoices from the County office.

This compensation mechanism began in the first quarter of 2008. Between 2002 and 2007, CHERT members invoiced the gravel operators directly and were paid directly. Prior to 2002, the process for paying CHERT members was not well defined. At various times, payment has been handled by the SMAC, by Humboldt County Department of Public Works, and by the operators themselves.

Based on invoice totals from all four CHERT members, their workload is highly variable on both monthly and annual bases (Figure 2-9). CHERT scientists' billing hours increase with increasing federal and state involvement in site visits and plan reviews. Operator costs, not including CHERT scientists' fees, increase due to increasing monitoring requirements and changes in mining methods (some methods, such as wetland pit extraction, cost more per yard to extract).

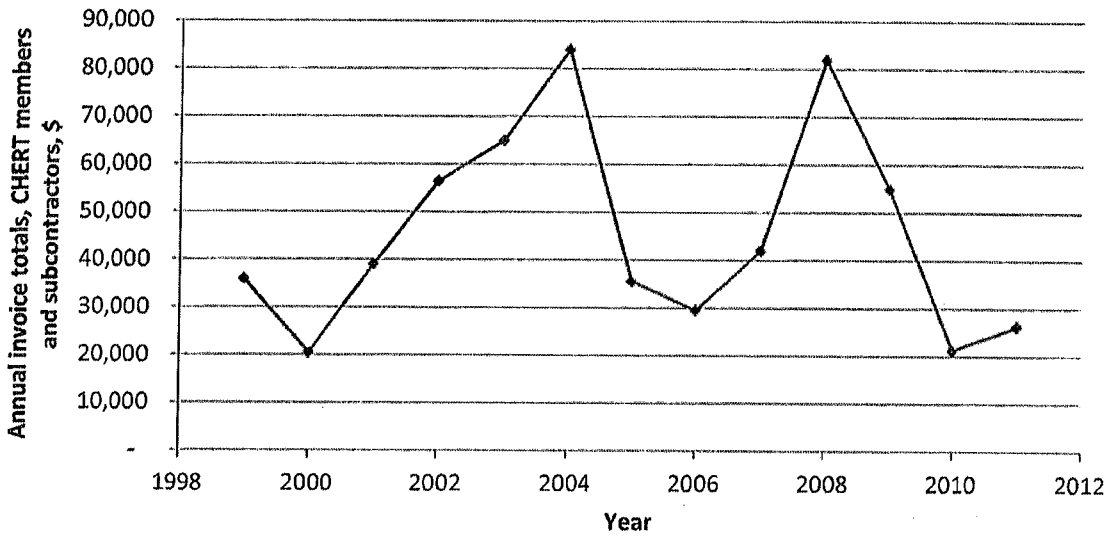


**Figure 2-9. Invoice totals indicate that CHERT team members work part-time, and that the amount of work is highly variable. Note: totals include charges for all Humboldt County operators and are not restricted to the Mad River operations.**

In 2004, when CHERT charged relatively more than previous years, the total annual invoice from all four members was approximately $85,000, which is approximately one full-time position. The CHERT costs for this period included preparation and analyses of cross sections and biological habitat, which are projects that are not part of routine CHERT services. Costs since 2007 were higher due to additional cross section analysis, COE's permit renewal procedures, and CHERT participation in preparing this Supplemental PEIR. CHERT members work on a limited, part-time "on call" basis, whenever gravel operators are ready for their services; they attend meetings, visit sites, conduct pre-extraction plan reviews, conduct post-extraction report reviews, and prepare post extraction and other periodic related reports.

### 2.2.5 CHERT Regulatory Setting

This Draft SPEIR updates information of the 1994 PEIR. Many agencies will likely use this document while making discretionary decisions on their respective permits and approvals; permits are listed in Table 2-8.

**Table 2-8. Permits and approvals for gravel extraction operations in Humboldt County (HCDCDS 2008)**

| Permit Name | Agency Issuing Permit |
|---|---|
| Conditional use permit or special permit | Humboldt County Planning & Building Department |
| Reclamation plan and financial assurances | Humboldt County, California Department of Conservation |
| Streambed alteration agreement | CDFW |
| Section 401 water quality certification, General Waste Discharge Requirements, NPDES permits for batch plants | North Coast Regional Water Quality Control Board |

| Permit Name | Agency Issuing Permit |
|---|---|
| Storm Water Pollution Prevention Plan | North Coast Regional Water Quality Control Board |
| Letter of Permission or Individual Permit; application for Department of the Army permit. | COE |
| Section 7 consultation for Incidental Take Permit | National Marine Fisheries Service, U.S. Fish and Wildlife Service, CDFW |
| Permit to Operate for concrete batch plants or aggregate crushing and sorting processes | North Coast Unified Air Quality Management District |

When the January 2009 Draft SPEIR was circulated, comments from the public and agencies were received. Two public hearings were held before the Humboldt County Planning Commission to accept comments. During the period between the second public hearing and the issuance of this Draft SPEIR, numerous meetings between the County, operators, CHERT, and resource agencies were held. Comments and responses are addressed and incorporated into this Draft SPEIR; the Final SPEIR will contain tabulated comments and responses and will refer back to this Draft SPEIR for detailed discussions of the affected environment, the project and alternatives, and potential impacts and mitigations.

The Humboldt County Planning & Building Department, as the Lead Agency, will submit the Final SPEIR to the Humboldt County Planning Commission to certify that the document was prepared in compliance with CEQA. If any of the environmental impacts identified in the Final SPEIR remain significant after mitigation, the Humboldt County Planning Commission will make findings that support its decision on the project. If the Humboldt County Planning Commission decides to approve the project, it will then file a Notice of Determination. Humboldt County Planning Commission action on the project and its environmental document is subject to appeal to the Humboldt County Board of Supervisors.

Gravel extraction requires either an individual permit from COE covering a single operator, or a Letter of Permission (LOP) covering a group of operators that have not pursued individual permits. Both individual permits and LOPs are discretionary acts by COE. Because issuing the individual permit or LOP could affect threatened, endangered, or special status (TES) species, COE will enter into "Section 7" consultation with the National Marine Fisheries Service and/or the US Fish and Wildlife Service, depending on the species potentially affected. These agencies would then issue BOs describing their findings related to TES species effects from the Proposed Project; in July 2010, NMFS did issue a BO.

During the Notice of Preparation's public and agency comment period, the North Coast Regional Water Quality Control Board requested "...an independent third party peer review of the effectiveness of the CHERT program in meeting the County's goals." The effectiveness of the CHERT program and the analyses and assumptions supporting it, has been reviewed by resource agency scientists but not by the larger scientific community, as would occur during publishing in the scientific literature. The 2009 Draft SPEIR received detailed and extensive review by knowledgeable people representing the public and resource agencies. These reviewers are considered independent and third party, and given the credentials and specialized knowledge of resource agency staff, their comments can also be considered as constituting "peer review." Based on comments received on the Notice of Preparation, reviewers representing the public also have a high degree of specialized knowledge and understanding, whether gained through formal education or through self-guided study of the scientific literature and environmental permitting documents. Therefore, the agencies' and public's reviews are considered to be "peer review."

# 3 ENVIRONMENTAL SETTING

As discussed in Section 1, this Draft SPEIR contains "only the information necessary to make the previous EIR adequate for the project, as revised" (Title 14 CCR Chapter 3, Article 9, Sections 15122 through 15131). Based on updated information since the 1994 PEIR, the NOP's listed effects, and comments on the NOP and the January 2009 Draft SPEIR, this Draft SPEIR discusses the following environmental factors[6]:

- Air quality, specifically air quality impacts related to fugitive dust emissions, the potential of extraction operations to mobilize naturally occurring asbestos, and diesel exhaust emissions
- Biological factors, specifically project effects on riparian and aquatic habitat and these species: Southern Oregon/North Coastal California coho, Northern California steelhead, Central California Chinook salmon, longfin smelt, northern red-legged frog, northwestern pond turtle, foothill yellow-legged frog, bullfrog, and willow flycatcher
- Geological and hydrologic factors, specifically potential impacts on bank stabilization and downstream hydrology, the estimates of average annual recruitment volume and its geomorphological effects, and the benefits of installing large woody debris and other habitat enhancements
- Utilities and public services, specifically the potential impacts on roads and bridges
- Water quality, specifically the project's potential impacts on sediment and temperature
- Cultural factors, specifically an evaluation of whether a new cultural resources study is needed
- Climate change, specifically the project's generation of greenhouse gases

The purpose of an environmental setting section is to provide sufficient information such that impacts due to the project or its alternatives can be identified. Once identified, the significance of each impact is determined; to do this, "significance" and baseline conditions are defined. Significance and baseline conditions are often specific to each resource. For example, if a wildlife species is endangered, then a baseline of current conditions would not be proposed. However, as another example, if air quality is good and meets all standards, then current conditions would be a good proposed baseline.

In the environmental setting sections that follow, we focused on:

- Presenting updated research, studies, and analyses available since 1994,
- Summarizing comments, varying scientific interpretations, and whether scientific consensus has been reached,
- Characterizing present and possible future conditions, and
- Proposing definitions of significance and baseline conditions.

In Section 4, we evaluate if the Proposed Project or its alternatives will significantly affect these factors, and if so, what mitigation measures could be implemented to avoid, minimize, or compensate for those impacts.

[6] For the full list of environmental factors, see the "CEQA Checklist" at http://ceres.ca.gov/topic/env_law/ceqa/rev/appg_102698.pdf

## 3.1 Air Quality

The purpose of this section is to update the air quality information in the 1994 PEIR. Updates include greater detail in criteria for air pollutants standards, new regulations and a County-wide management plan for particulate matter, recent regulations for off-road diesel vehicles, and greater concern and regulation of naturally occurring asbestos. This section will also describe potential sources of particulate matter in the gravel extraction process, and the permits that operators hold.

### 3.1.1 Air Quality Environmental Setting

In general, the air quality within Humboldt County is good; all federal and state criteria pollutant standards are met except for one: the California state level for particulate matter equal to or less than 10 microns diameter (PM10) (HCDCDS 2007b). PM10 is considered a pollutant because particles of diameter 10 microns or less can irritate and damage lung tissue. In May 1995, a "Particulate Matter Attainment Plan" was adopted by the North Coast Unified Air Quality Management District (NCUAQMD). Because Humboldt County does not always meet the PM10 standard, the air district[7] has classified the county as "nonattainment" (that is, the County does not always attain the air quality set by the standard. The California state PM10 standard is 20 micrograms/cubic meter, and annual averages sometimes exceed the PM10 standard, as seen in Table 3-1.

**Table 3-1. Annual average PM10 concentrations in Humboldt County (HCDCDS 2007b)**

| Year | PM10 (micrograms/cubic meter) |
|---|---|
| 1996 | 19.0 |
| 1997 | 21.0 |
| 1998 | 15.9 |
| 1999 | 19.9 |
| 2000 | 21.8 |
| 2001 | 21.3 |

A forecast by the California Air Resources Board (CARB) predicts that PM10 levels will continue to increase (HCDCDS 2007b). From 2005 to 2020, their prediction indicated an increase of 4.5% over the 15-year period. Almost half of the increase is predicted to be from unpaved and paved road dust (29% and 27%, respectively). Actual 2005 data indicated unpaved road dust is a relatively larger (47%) PM10 source, as quantified in Table 3-2 (HCDCDS 2007b).

**Table 3-2. PM10 emissions in 2005, Humboldt County (HCDCDS 2007b)**

| PM10 Source | Percentage of Total PM10 |
|---|---|
| Sources[a] contributing less than 5% | 27 |

[7] The district is the North Coast Unified Air Quality Management District, which includes Humboldt, Del Norte and Trinity counties.

| PM10 Source | Percentage of Total PM10 |
|---|---|
| Paved road dust | 10 |
| Managed burning and disposal | 13 |
| Residential fuel combustion | 13 |
| Unpaved road dust | 47 |
| Total | 100 |

[a] These sources include fugitive wind blown dust, off-road equipment, electric utilities, construction and demolition, manufacturing and industrial, wood and paper, and ships and commercial boats.

In the 1994 PEIR, sources of emissions in the Mad River basin were described; non-stationary sources mentioned were slash burning after timber harvesting in forest lands in Fieldbrook, McKinleyville, Korbel and Blue Lake; and vehicle emissions along Highway 299. Stationary sources include the power plant in Blue Lake, and the Calgon Carbon plant, also in Blue Lake.

Vehicle and heavy equipment emissions are sources of other criteria pollutants besides PM10. These other criteria pollutants include carbon monoxide, nitrogen dioxide, and sulfur dioxide, which are particularly important due to their roles in "greenhouse gas" chemistry. The relevant California ambient air quality standards are tabulated in Table 3-3; federal ambient air quality standards are equal to or less stringent than California standards. Federal standards are given when California has not set a standard at a corresponding averaging time.

**Table 3-3. California ambient air quality standards (NCUAQMD 2005a)**

| Pollutant | Averaging Time | Concentration (micrograms/cu meter) |
|---|---|---|
| Ozone | 1 hour | 180 |
| | 8 hour | 235[a] |
| PM10 | 24 hour | 50 |
| | Annual arithmetic mean | 20 |
| Carbon monoxide | 1 hour | 23 milligrams/cu meter |
| | 8 hour | 10 milligrams/cu meter |
| Nitrogen dioxide | 1 hour | 470 |
| | Annual arithmetic mean | 100[a] |
| Sulfur dioxide | 1 hour | 655 |
| | 24 hour | 105 |

| Pollutant | Averaging Time | Concentration (micrograms/cu meter) |
|---|---|---|
| | Annual arithmetic mean | 80[a] |

[a] This is the federal standard; no California standard has been set.

In July 2007, CARB adopted regulations for diesel particulate matter and nitrogen oxides from off-road heavy-duty diesel vehicles (CARB 2008a). These regulations became effective 15 June 2008, and seek to reduce particulate matter 85% from year 2000 baseline levels, by year 2020 (CARB 2008b).

Owners of regulated diesel vehicles must retrofit with CARB-approved emissions control devices; the regulations encourage owners to "turn over" their fleets to newer and cleaner engines (CARB 2008b). According to CARB:

> "Turn over" means repowering with a cleaner engine, rebuilding the engine to a more stringent emissions configuration, retiring a vehicle, replacing a vehicle with a new or used piece, or designating a dirty vehicle as a low-use vehicle.

Owners comply with the regulation by either reducing their fleet-averaged PM rate so it reaches a target rate, or by applying the highest level verified emission control system(s) to 20% of the fleet. The compliance dates depend on the size (in horsepower) of the fleet, with categories of small, medium, and large fleets. For any size fleet, the fleet-average PM rate may also be decreased by using alternative fuels instead of diesel. Use of an alternative fuel would also decrease a fleet's "greenhouse gas" emissions.

Another new concern since the 1994 PEIR is naturally occurring asbestos, which is an airborne toxic mineral that can be found in six crystal forms (Clinkenbeard et al. 2002). Naturally occurring asbestos is regulated by the North Coast Unified Air Quality Management District, by requiring construction, grading, quarrying, and surface mining operations to register with the District. After registration, the owner may be required to submit a dust control plan. The plan could include measures such as limiting the speed of heavy equipment, cleaning vehicles of dust prior to driving them on highways, wetting stockpiles, and air monitoring.

Naturally occurring asbestos can be found in serpentine and ultramafic rock (CARB 2006). A map of naturally occurring asbestos sources within the state is available online (ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf). In upland quarries within Humboldt County, asbestos-containing minerals have been documented (HCDCDS 2007c).

However, under certain conditions and as determined by the North Coast Unified Air Quality Management District, sand and gravel mining operations may be exempt from the regulations covering naturally occurring asbestos. Exemptions may be allowed if at "crushing, screening and conveying operations, stockpiles, and off-site material transport at a sand and gravel operation... the operation processes only material from an alluvial deposit" (CARB 2006).

### 3.1.2 Air Pollutants from Gravel Extraction

Particulate matter (dust), asbestos, and greenhouse gases (GHG) may be generated during the grading, extraction, and recontouring operations of gravel extraction. Dust and asbestos are associated with disturbance of rock and soil, and use of heavy equipment and vehicles. Exposure to asbestos is unlikely

because it is a mineral occurring primarily in the upland areas of the watershed. Self-propelled mobile construction equipment is exempt from both "permit to construct" and "permit to operate" regulation (NCUAQMD 2005b). Greenhouse gases are generated from heavy equipment exhaust. Potential effects due to GHG emissions are evaluated in Section 4.9.

### 3.1.3 Summary of Present and Possible Future Conditions

The above information is summarized in Table 3-4.

**Table 3-4. Air quality present and future conditions**

| Air Quality Criterion | Present Conditions | Future Conditions |
|---|---|---|
| PM10 concentrations from gravel extraction and diesel combustion | County-wide annual average PM10 concentrations have exceeded State standards. At gravel operation sites, self-propelled mobile construction equipment is exempt from both "permit to construct" and "permit to operate" regulation. | County-wide annual average PM10 concentrations are expected to increase in the future. At gravel operation sites, no increase in rate of PM10 generation is expected. Implementing new diesel regulations will allow operators to meet equipment and vehicle "turnover" targets. |
| Naturally occurring asbestos (NOA) | Upland geology indicates that NOA is likely. Exemptions to NOA regulation may be allowed if at "crushing, screening and conveying operations, stockpiles, and off-site material transport at a sand and gravel operation... the operation processes only material from an alluvial deposit" (CARB 2006). | Exposure to NOA due to gravel extraction is not likely to increase in the future. |

### 3.1.4 Definition of Significance and Baseline Conditions

Definitions of significant impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Using these guidelines, a potentially significant impact on air quality occurs if the project:

- Violates any ambient air quality standard
- Contributes "substantially" to an existing or project air quality violation
- Exposes sensitive receptors to "substantial" pollutant concentrations, and/or
- Results in inconsistency with air quality plans designed to bring an area into "attainment."

These definitions of significance correspond to the measures found in the Permits to Operate. Therefore, if a Permit to Operate is granted, one could assume that all impacts are less than significant with the Project activities as proposed; no mitigation measures would be required if work proceeds as specified in the permit.

Except for PM10, baseline air quality conditions are considered to be existing conditions. For PM10, the PM10 criteria pollutant ambient air quality standard is considered the baseline.

## 3.2 Biological Environment

Based on updated information since the 1994 PEIR, the NOP's listed effects, and comments on the NOP and the January 2009 Draft SPEIR, this Draft SPEIR discusses the following species and their habitats:

- Southern Oregon/North Coastal California coho (*Oncorhynchus kisutch*),
- Northern California steelhead (*Oncorhynchus mykiss*),
- California Coast Chinook salmon (*Oncorhynchus tshawytscha*),
- Longfin smelt (*Spirinchus thaleichthys*),
- Northern red-legged frog (*Rana aurora*),
- Northwestern pond turtle (*Clemmys marmorata marmorata*),
- Foothill yellow-legged frog (*Rana boylii*),
- Bullfrog (*Rana catesbeiana*), and
- Willow flycatcher (*Empidonax traillii*).

These species and habitats were of interest to those who responded to the NOP and January 2009 Draft SPEIR, due to the species listing (for example, the endangered status of the willow flycatcher) or due to the species ecological importance (for example, the invasive and predatory bullfrog). The species regulatory listings were reviewed and summarized in Table 3-5.

**Table 3-5. Species addressed in this Draft SPEIR, with their regulatory status listings (CDFG 2008, 2009b)**

| Species Common Name or Habitat | Species Scientific Name | Federal | State |
|---|---|---|---|
| Southern Oregon/North Coastal California coho | *Oncorhynchus kisutch* | Threatened; Critical Habitat designated | Threatened |
| California Coastal Chinook salmon | *Oncorhynchus tshawytscha* | Threatened; Critical Habitat designated | No State listing |
| Steelhead-Northern California | *Oncorhynchus mykiss* | Threatened; Critical Habitat designated | No State listing |
| Longfin smelt | *Spirinchus thaleichthys* | No Federal listing but USFWS seeking additional information | Threatened |
| Northern red-legged frog | *Rana aurora* | No Federal listing | No State listing but classified as "Species of Special Concern" by CDFW |
| Foothill yellow-legged frog | *Rana boylii* | No Federal listing | |

| Species Common Name or Habitat | Species Scientific Name | Federal | State |
|---|---|---|---|
| Northwestern pond turtle | *Clemmys marmorata marmorata* | No Federal listing, but Classified as "Sensitive" by the US Forest Service | |
| Bullfrog | *Rana catesbeiana* | No Federal listing[c] | No State listing but considered a predator and invasive species. |
| Willow flycatcher | *Empidonax traillii* | No Federal listing | Endangered |

The following sections provide a brief and general description of riparian vegetation and species conditions, and then, when possible, provide information specific to the Lower Mad River. Summaries of present and future conditions are provided, along with definitions of significance and baseline conditions. In Section 5, potential Project and alternative effects are analyzed, and if found significant, mitigations are also provided.

### 3.2.1 Riparian Habitat

Vegetation conditions of the Mad River watershed are generally described in the Draft Humboldt County General Plan (HCDCDS 2008); approximately 80% of the watershed is fir (37%), redwood (24%), and oak woodlands (20%). Since 1994, four riparian habitat studies have described conditions specific to the lower Mad River. 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.

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, changes in the areas of 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.
The results of the four studies are described in detail in Appendix B.

Trush classified riparian vegetation into "channelbed types" which include geomorphic features as well as riparian vegetation, into his riparian trend analyses. Channelbed types were active, floodplain, open, terrace, and woodland types. He then estimated the areas of these channelbed types over time.

In general, riparian habitat quantity (area) has not increased since the formation of CHERT, but riparian habitat quality has increased. 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.

#### 3.2.1.1 Comments on Riparian Habitat

NMFS, CDFW, and CHERT scientists have discussed various aspects of riparian habitat, in meetings, comment letters, and responses to comment letters; their comments are summarized in Table 3-6.

**Table 3-6. Comments on riparian habitat and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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 | This text has been added to the Project Description: "Comments from resource agencies indicated that a riparian vegetation specialist should be more closely involved with the CHERT adaptive management process. This Draft SPEIR clarifies when a riparian vegetation specialist is needed, by listing the specialist's responsibilities and tasks: [duties of the riparian specialist follow]" | Yes | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR |

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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<br><br>Riparian regime is maintained but not improved. Potential riparian effects require mitigation | A desired riparian condition has not been defined, nor has a "riparian potential"; given the disturbance ecology, defining either would be difficult. Simplifying of the low flow channel is the issue to address, not whether riparian areas have increased or decreased<br><br>If extraction stays within the active channel, then riparian effects are less than significant | No | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR<br><br>June 30, 2009 meeting with resource agencies, County and CHERT team |
| Extraction makes the riparian vegetation habitat classes younger, which is supported by references stating that mining affects riparian conditions | These references document effects on over-extracted rivers, and are not applicable to the sustained yield extraction happening on the Mad River | No | June 30, 2009 meeting with resource agencies, County and CHERT team |
| Extraction stockpiles and processing shall be discouraged within a 150-foot riparian stand along each side of the Mad River and where practicable reestablished beyond a riparian boundary of 150 feet | This text has been added to the Project Description: "Within five years of certification of this Supplemental PEIR, the riparian specialist shall work with CDFW and individual mining operators to develop site specific and practicable recommendations for riparian protection, enhancement and recovery plans associated with upland stockpiling and processing operations" | Yes | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR |
| 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 | This text has been added to the Project description: "A trespass management plan shall be submitted to the Humboldt County Planning & Building Department and CDFW for review and approval" | Yes | March 18, 2009 comment letter on 2009 Draft SPEIR |

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| Use of channelbed types is questionable because "the actual vegetation acreages are masked and unknown." The riparian analyses should "evaluate actual riparian vegetation" | This level of data collection is unnecessary for evaluating the potential effects of sustained yield extraction, because:<br>• Potential effects will be on a community scale, not on an individual plant scale<br>• The riparian classifications used in all previous studies (NRM 2000a, 2000b, 2000c, Trush 2008a) are associated with specific plant communities<br>• Channelbed types include geomorphic information that individual plant data would not | No | NMFS comments on January 2009 Draft SPEIR |

### 3.2.1.2 Summary of Present and Possible Future Conditions

The present and possible future conditions for riparian habitat areas are summarized in Table 3-7.

**Table 3-7. Riparian habitat summary of present and possible future conditions**

| Riparian Habitat Criterion | Present Conditions | Possible Future Conditions |
|---|---|---|
| Area | Riparian habitat area has not substantially increased or decreased since 1994. Approximately 900 acres per year of riparian habitat was delineated from 1994, 1997, and 2007 aerial photos | In areas within the direct influence of gravel extraction operations, riparian habitat area is likely to remain relatively constant; permit requirements stipulate that direct loss of riparian habitat must be avoided, minimized, or compensated |
| Quality | Riparian habitat quality has increased through extraction techniques such as wetland pits and alcoves, and by avoidance of areas that could mature into riparian habitat | Riparian habitat quality is likely to remain similar to that of present conditions, however, it could decrease if wetland pits and alcove extraction techniques are curtailed to suppress bullfrogs |

## 3.2.2 Aquatic Habitats

On the Mad River, aquatic habitat information specific to wildlife other than fish is limited, but four studies were obtained:

- [MRB] Mad River Biologists. 1993. Draft Program Environmental Impact Report for gravel mining - Mad River, Humboldt County - Wildlife. [Internet]. [cited May 24, 2008]. Available from: http://co.humboldt.ca.us/planning/smara/docs/mrg-appendix-d.pdf.
- Stillwater Sciences. 2008. Draft 2007 fisheries monitoring program report for gravel extraction operations on the Mad, Eel, Van Duzen, South Fork Eel, and Trinity rivers. Arcata (CA): Humboldt County Gravel Operators.
- Trush, B. 2008a. Lower Mad River woody riparian vegetation trend between WY1994 and WY2007.

- Stillwater Sciences. 2010. Mad River watershed assessment. Final report. Prepared in association with Redwood Community Action Agency, and Natural Resources Management Corp. Eureka, CA.

Temporary pools and backwaters were described by MRB (1993) as "seasonal and temporary quiet waters that develop along the river's course." During low flow water years, emergent aquatic vegetation can develop, creating important habitat for red-legged frogs, northwestern pond turtles, foothill yellow legged frogs, bullfrogs, and other amphibians. MRB noted that data supporting and defining this habitat importance were scarce.

Freshwater marshes and ponds were differentiated from pools and backwaters by being "more-or-less" permanent (MRB 1993). Being quasi-permanent, these habitats develop complex habitat structures, supporting a variety of wildlife. Also included in this habitat are ponds or pits developed during gravel extraction [Note: MRB's definition of "pits" does not correspond to that of Trush (2008a, see below)].

Alcove areas have been measured annually since 2004; data are available from 2002 but "should not be viewed with as high a degree of confidence as 2004-2007" (Stillwater Sciences 2008) because during that year, the methodology for measuring alcove area was still being developed. Alcove areas were measured at extraction sites, as detailed in Table 3-8. Areas are variable between sites in single years, and are variable at a single site over the four years. Given the alcoves' highly variable areas, they would probably be classified under the "temporary pools and backwater" habitat class of MRB (1993). We would expect species and habitat importance similar to those associated with temporary pools and backwaters.

**Table 3-8. Alcove areas (acres) on the lower Mad River (Stillwater Sciences 2008)**

| Operator and Site | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|
| Mad River Sand and Gravel, Guynup Bar | 0.13 | 0 | 0.15 | 0.38 |
| Granite Construction[a], Emmerson and Blue Lake bars | 0.53 | 0.27 | 0.82 | 0.97 |
| Eureka Ready Mix, Christie Bar | 1.40 | 0.55 | 1.29 | 0 |
| Granite Construction[a], Johnson Bar | 0.40 | 0.63 | 0.58 | 0.48 |
| Mercer Fraser Company, Essex Bar | No data | 0.27 | 0.13 | 0.21 |
| Eureka Ready Mix, Johnson-Spini, and Oneill bars | 0.12 | 0.35 | 0.11 | 0.67 |
| Total | 2.65 | 2.07 | 3.08 | 2.71 |

[a] Granite Construction no longer operates in Humboldt County.

Gravel pit wetlands were described by Trush (2008a) as "man-made excavations" excavated deep enough to "create a pond sustained by shallow groundwater year-round." Gravel pit wetlands were likely included in the alcove areas measured by Stillwater Sciences (2008). Gravel pit wetland design includes gently sloping banks that encourage colonization by aquatic plants around the perimeter with deeper sections farther into the pits. They are best located in relatively low elevation depositional areas that are inundated by 5-yr floods or larger floods. Although short-lived and expected to fill-in over time, they increase habitat diversity and provide

"abundant, high-quality avian and amphibian habitat" on an interim basis. Young salmonids sometimes occupy these pits for a year or more before migrating to the ocean.

Gravel pit wetlands have been constructed on Christie, Blue Lake, and Emmerson bars during the CHERT years. 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 C). 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 through normal lateral channel migration. Similar conditions have occurred at wetland pits excavated on Blue Lake and Emmerson bars (Trush 2008a).

Gravel extraction practices avoid complex backwater regions as found in downstream alcoves and upstream entrances to side-channels, as well as along the wetted outside margins of gently sloping gravel bars, so as to preserve amphibian habitat. However, no inventories have been performed in the Lower Mad River to establish amphibian habitat abundance or population trends between WY1994 and WY2007.

#### 3.2.2.1 Comments on Aquatic Habitat

NMFS, CDFW, and CHERT scientists have discussed various aspects of aquatic habitat, in meetings, comment letters, and responses to comment letters; their discussions are summarized in Table 3-9.

**Table 3-9. Comments on aquatic habitat and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| Impacts on critical salmon and steelhead habitat should be mitigated by placing LWD instream throughout the Project area | Long-term efficacy of LWD structures with large boulders is low; when river migrates away, the boulder will be an unnatural feature. CDFW and CHERT recognized that lack of wood is not related to gravel extraction per se, although roads allow access to illegal harvesting of wood that is available | No | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR<br><br>May 11, 2009 meeting with NMFS, CDFW, County, HTH and CHERT attending |
| Impacts of increased bank-full width, streambed simplification, and reduced pool depths, should be mitigated by placing LWD 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 | Sustained yield extraction does not increase bank-full width or reduce pool depths. How "streambed simplification" could be defined or measured is unknown. When the river migrates away from LWD enhancements, they remain as unnatural features. Another consideration is the relative importance of aquatic habitat created by LWD structures in the mainstem, compared to that provided by upstream tributaries. LWD has been placed in the river on a site by site basis by individual operators (Stillwater Sciences 2009) but was not placed as a mitigation for sustained yield extraction | No | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR |

#### 3.2.2.2 Summary of Present and Possible Future Conditions

The present and possible future conditions for aquatic habitat area are summarized in Table 3-10.

**Table 3-10. Aquatic habitat summary of present and possible future conditions**

| Aquatic Habitat Criterion | Present Conditions | Possible Future Conditions |
|---|---|---|
| Area | Aquatic habitat area is variable; for example, from 2006 to 2007, alcove area changed from 1.3 to 0 acres at Christie Bar | On a per site basis, flow and river dynamics will cause variability in aquatic habitat area |

### 3.2.3 Wildlife

General information on wildlife species and their habitats is available from resource agency and university-sponsored websites, and is summarized in the following sections. Wildlife species information specific to gravel extraction on the Lower Mad River is limited; only one study was obtained, by MRB (1993).

#### 3.2.3.1 Northern Red-legged Frog

On the California north coast, northern red-legged frogs are widespread in ponds and rivers where flow is quiet and emergent vegetation provides cover (MRB 1993). Breeding occurs in late winter and early spring; most young are completely transformed into adults by mid-summer or earlier. Breeding red-legged frogs were found "in many Freshwater Marshes and Ponds" in the Lower Mad River vicinity (MRB 1993; the capital letters signify a habitat type). Eggs require 30 to 45 days to hatch, often occurring in March to April; the metamorphosis to frog occurs 11 to 14 weeks later, in June to July (AmphibiaWeb 2008). Juvenile frogs occupy relatively moist, densely vegetative riparian habitats during the summer, as indicated in Table 3-11.

**Table 3-11. Life history stages of northern red-legged frog**

| Life History Stage | Mid Winter | Late Winter, Early Spring | Mid Spring | Late Spring, Early Summer | Mid Summer | Late Summer, Early Fall | Mid Fall | Late Fall, Early Winter |
|---|---|---|---|---|---|---|---|---|
| Breeding | | | | | | | | |
| Eggs hatch | | | | | | | | |
| Tadpoles | | | | | | | | |
| Metamorphosis | | | | | | | | |
| Juvenile, adults | | | | | | | | |

The status of this species is federally listed as threatened; the US Fish and Wildlife Service designations of critical habitat area have been challenged numerous times in court (USFWS 2006). Humboldt County does not contain any of the 34 critical habitat units designated in the April 2006 rule. However, on September 16, 2008, the Service opened a 60-day comment period for a new plan to designate 1.8 million acres of critical

habitat, which is 300% larger than the area designated in 2006 (USFWS 2008). The new proposed area includes units in Mendocino but not Humboldt counties.

#### 3.2.3.2 Northwestern Pond Turtle

The northwestern pond turtle is found "downstream at least to the Blue Lake bridge area" but "its status along the Mad River needs documenting" (MRB 1993). In northern California, it basks intermittently in the morning, and then in late afternoon or early evening they begin foraging. In one population in a northern California stream, a male home range was estimated to be 2.4 acres; the female's range was much smaller (0.6 acres). It can be found in a wide range of wetland habitats including "rivers and streams (both permanent and intermittent), lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, abandoned gravel pits, stock ponds, and sewage treatment lagoons" (Holland 1994, as cited by Lovich Undated).

It is active from February to November, and is often observed basking on surfaces above water. During summer droughts, it can bury itself in soft bottom mud. Breeding occurs between April and August, when females climb onto stream or pond margins, to dig a nest. In northern California and Oregon, hatchlings remain in the nest through the winter (Holland 1994, as cited by Lovich Undated).

Federal agencies have designated this species as a sensitive species. Wetland habitat destruction is their single greatest threat; predation by bullfrogs is also noted (Lovich Undated).

#### 3.2.3.3 Foothill Yellow-legged Frog

Information on the foothill yellow-legged frog specific to the Mad River was scarce. The report supporting the 1993 programmatic EIR for gravel extraction simply states "its specific status along the Mad River in the study area needs to be determined" (MRB 1993). Within Humboldt County, but on the Trinity River, personal observations and a literature review were documented by the USDA Forest Service (Ashton et al. 1997). Breeding sites were shallow, slow flowing water with pebble and cobble substrate. The adults and sub-adults preferred river bars along both riffles and pools, with some shade. Occasionally, it was found in other riparian habitats such as backwater, isolated pools, or slow moving water with mud substrate.

In the spring, adult frogs congregate along gravel/cobble river bars, where breeding occurs in shallow, slow flowing water. "Previous literature reports breeding to occur from late March through May, with oviposition for any single population being concentrated to a 2-week period... in the Trinity River, breeding activity occurs over a 3-month period from April through late June" (Ashton et al. 1997) with most oviposition occurring in May and early June. In the mainstem Trinity River, eggs hatch in 27 to 36 days, but incubation is temperature dependent and this time period may be longer due to cold water dam releases (Ashton et al. 1997). Growth to maturity is also temperature dependent; some individuals may reproduce as early as 6 months after metamorphosis (Jennings 1988, as cited by Ashton et al. 1997).

CDFW classifies this species as a "Species of Special Concern." It has disappeared in "possibly up to 45 percent" of its range in California, but the most affected areas are in the southern and Sierra Nevada portions of the state.

#### 3.2.3.4 Bullfrog

Information on bullfrogs specific to the Mad River was scarce. The report supporting the 1994 PEIR for gravel extraction simply states "in the study area, the bullfrog's specific status needs to be determined" (MRB

1993). It is present throughout much of the United States and is the largest frog in North America. It is highly aquatic and never strays far from permanent water (USFS Undated), preferring water with thick aquatic vegetation.

Breeding is from February through July in permanent water bodies (USFS Undated). Some tadpoles overwinter before transforming into adults. Adults spend winters in the soft muddy bottoms of ponds, lakes, or other water bodies.

A bullfrog "eats any animal that can be swallowed" (USFS Undated) and is considered by many to be one of the primary reasons why other frog species are in decline. In Humboldt County but on the Trinity River, "native species and bullfrog distributions were inversely correlated along the 43-mile river reach below the dam" (Fuller 2008). Fuller (2008) concluded that bullfrog control should be focused on its breeding habitat, which became greater after dam construction and operation. At least one other study questioned bullfrog's importance in native frog population decline; introduced fish species offered another predator that could be important in native frogs' declines (Hayes and Jennings 1986). Whether a key factor, or just one of many including habitat loss, climate change, or water quality, bullfrogs are important predators that contribute to native frogs' declines.

Bullfrog populations are likely to continue to grow, assuming they continue responding favorably to disturbed aquatic environments and that more aquatic environments are disturbed due to development, change in surface and groundwater regimes, water quality, and climate change. Gravel operations do not purposefully affect bullfrogs beneficially, but beneficial habitat conditions are similar to other amphibians such as red-legged and foothill yellow-legged frogs, and northwestern pond turtles. Fuller (2008) suggests that limiting bullfrog breeding sites would be an effective means of controlling bullfrog populations.

CDFW's policy on bullfrogs is to support all activities that will limit bullfrogs. "Bullfrog control must be expedited and control and/or eradication should be a priority for the Project..." (CDFG 2009a). CDFW staff suggests decreasing bullfrog habitat by dewatering, filling to surrounding grade, and/or de-populating (killing or removal) as methods of control.

Bullfrog habitat is created by man-made structures and natural river processes. Artificial structures include stockponds, and wetland pits and alcoves created during extraction. Naturally created bullfrog habitat includes oxbows or alcoves.

The original intent of the wetland pit and alcove extractions was to create aquatic habitat, specifically red-legged frog habitat; therefore, limiting wetland pits and alcoves to control bullfrogs would also decrease habitat for red-legged frogs.

Suppression of bullfrogs, rather than eradication, is a realistic goal, if red-legged frog habitat is to be simultaneously conserved or recovered. Suppression techniques could include:

- Identifying inundation frequencies and elevations, and relating them to the bullfrog's 2-year breeding and rearing requirements. Inundation frequencies and elevations could be identified by mid-winter aerial photography, field observation, or computer modeling.
- Reviewing and/or determining life history requirements of bullfrogs and red-legged frogs that could be used to favor red-legged frogs, as indicated in Table 3-12.

**Table 3-12. Life history timing and requirements of northern red-legged frog (yellow)[a] and bullfrogs (green)[b]**

| Life History Stage | Mid Winter | Late Winter, Early Spring | Mid Spring | Late Spring, Early Summer | Mid Summer | Late Summer, Early Fall | Mid Fall | Late Fall, Early Winter |
|---|---|---|---|---|---|---|---|---|
| Breeding | | | | | | | | |
| | | | | | | | | |
| Eggs hatch | | | | | | | | |
| | | | | | | | | |
| Tadpoles | | | | | | | | |
| | | | | | | | | |
| Metamorphosis | | | | | | | | |
| | | | | | | | | |
| Juvenile and adult frogs | | | | | | | | |
| | | | | | | | | |

[a] AmphibiaWeb 2008, MRB 1993
[b] USFS Undated

### 3.2.3.5 Willow Flycatcher

In 1993, when the biological surveys were performed for the 1994 PEIR, the willow flycatcher was "not yet known to exist" in the area (MRB 1993). Since that time, numerous sightings have been documented, as summarized in Table 3-13, but although potentially present in willow-dominated habitat, summering in Humboldt County is believed to be a rare and localized phenomenon (USBLM 2008).

**Table 3-13. Documented accounts of willow flycatcher sightings near the Mad River**

| Sighting Documented | Reference |
|---|---|
| One record of two individuals in Hettenshaw valley | Hunter and Hazard 1998 |
| Migrant willow flycatchers have been documented in the Lanphere dunes region but generally are rare | USBLM 2008 |
| Sightings at Arcata Marsh, and Eel River Drive between Loleta and Fernbridge | |
| Private residence in Arcata | NCBA 2007 |
| Blue Lake Fish Hatchery | |
| Sighting of singing male in 2010, Riverside Ranch, near mouth of Eel River | GEC et al. 2011 |

The willow flycatcher is a small (5 to 7 in) bird; it is migratory and winters in Mexico, Central America, and northern South America. It is a "late spring migrant" (NAS Undated). Breeding habitat is characterized by high moisture, often in standing or running water, and can occur "as far south as southern parts of California and Arizona" (NAS Undated). The nest is built close to the ground in the crotch of bushes or small trees near water. Incubation requires approximately 12 to 13 days, with another 12 to 14 days to fledge.

### 3.2.3.6 Comments on Wildlife Factors

NMFS, CDFW, and CHERT scientists have discussed various aspects of wildlife factors in meetings, comment letters, and responses to comment letters, which are summarized in Table 3-14.

**Table 3-14. Comments on wildlife resources and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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 | The technical basis and study plan for such surveys is questionable; how these data could be interpreted to indicate whether the adaptive management program is "working" is unclear. For example, if wildlife surveys indicated a decrease in wildlife, the decrease could be attributed to sustained yield extraction, natural variation in water years and habitat, and other watershed land uses such as timber production, transportation, and residential land use. If wildlife surveys indicated an increase in wildlife, the increase could again be attributed to extraction designs, and natural variation in water years and habitat. Because the wildlife survey data could not lead to indications of how well the adaptive management program was performing, CHERT scientists did not collect (or hire subcontractors to collect) the data. Instead, CHERT and others have monitored and analyzed riparian and aquatic habitat (quantity and quality) and assumed that wildlife populations would be related to habitat. | No | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR<br>June 30, 2009 meeting with resource agencies, County and CHERT team |
| CDFW's policy is to do everything possible to limit bullfrogs | Limiting BF habitat would also limit red-legged frog habitat. | Yes | June 30, 2009 meeting with resource agencies, County and CHERT team |
| Drying out bullfrog habitat is one effective way to limit them; be careful that wetland pits do not last a long time | Monitoring groundwater elevations is possible, with data loggers that are already available. | Yes | June 30, 2009 meeting with resource agencies, County and CHERT team |
| Drying out of ponds would be sufficient, but could not say what survivorship could be if bullfrogs are flushed into river by pond turnover | Mid-winter aerial photos might provide inundation frequency locations; best way would be to observe inundation frequency lines and mark in field which bullfrog sources need to be examined; is it worthwhile to manage some wetland pits but not alcoves, oxbows, and other ponds unrelated to gravel extraction? | Yes | June 30, 2009 meeting with resource agencies, County and CHERT team |

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| Crafting a bullfrog mitigation measure should be part of the Supplemental PEIR | The Project Description has been revised to limit wetland pits and to perform a study that addresses management of habitat that favors both bullfrog and other amphibians. | Yes | June 30, 2009 meeting with resource agencies, County and CHERT team |
| 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. | This text has been added to the Project Description: "CHERT allows wetland pits only if they are capable of drying out for a period each summer to prevent bullfrogs."<br><br>This text has been added in the Wildlife impacts analysis: "The CHERT team and a CDFW amphibian specialist will design a study that would identify and determine whether additional extraction technique guidelines (such as the timings, locations, and depths of extraction pits and alcoves) could be developed, to favor red-legged frogs and suppress bullfrogs" | Yes | March 18, 2009 CDFW comment letter on 2009 Draft SPEIR |

### 3.2.3.7 Summary of Present and Possible Future Conditions

A summary of present and possible future conditions for wildlife species of concern is provided in Table 3-15Table 3-15. Future conditions are based on what could happen to the species' habitat in the lower Mad River, not to the species in general.

**Table 3-15. Wildlife species summary of present and possible future conditions**

| Species | Present Conditions | Possible Future Conditions |
|---|---|---|
| Northern red-legged frog | Federally listed as threatened, but critical habitat has not been designated in Humboldt County. State agencies classify this species as a "Species of Special Concern." | Efforts to conserve and protect these species are continuing but whether these efforts will be sufficient to improve the species' future conditions depends on public policy that affects numerous land uses in the Mad River watershed. Gravel extraction will be performed in conformance with permit requirements so that the species habitat is conserved and protected. |
| Northwestern pond turtle | Federal agencies have designated this species as a sensitive species. | |
| Foothill yellow-legged frog | State agencies classify this species as a "Species of Special Concern." | |
| Bullfrog | Bullfrogs are present in or in the vicinity of extraction sites in the Lower Mad River, including at least one wetland pit. The CDFW has expressed concern that wetland pits may enhance bullfrog habitat. | Bullfrogs will continue to be a nuisance predator species unless steps are taken to suppress or minimize its population growth. Studies for effective suppression that are related to gravel extraction will be part of the CHERT adaptive management program. Suppression activities related to gravel extraction will be implemented once they are identified. |

| Species | Present Conditions | Possible Future Conditions |
|---|---|---|
| Willow flycatcher | State listed as endangered. It is currently a migrant species in the Lower Mad River area. | Whether this species will become more prevalent in the Lower Mad River is unknown, but since early 1990s, more sightings seem to have been recorded. |

### 3.2.4 Fisheries

General information on species and their habitats is available from resource agency websites, and is summarized in the following sections. Information specific to the Lower Mad River comes from a number of studies, listed as follows:

- [NRM] Natural Resources Management. 1997. Final report on the results of the 1996 fisheries monitoring program on the Trinity and Lower Mad, Eel, and Van Duzen rivers. Eureka (CA): Natural Resources Management.
- Moody, G. 1997. Final report 1996 fisheries monitoring program for the Pacific Lumber Co. gravel operations.
- [NRM] Natural Resources Management. 2000d. Final report 1999 fisheries monitoring program for gravel extraction operations on the Mad, Eel, Van Duzen, and Trinity rivers. Eureka (CA): Natural Resources Management.
- [ABA] Alice Berg and Associates. 2002. Monitoring report October 15, 2002, dive survey of Emmerson bar wetland pits.
- [NRM] Natural Resources Management. 2003. Final report 2002 fisheries monitoring program for gravel extraction operations on the Mad, Eel, Van Duzen, and Trinity rivers. Eureka (CA): Natural Resources Management.
- [NMFS] National Marine Fisheries Service. 2004a. Biological Opinion of Letter of Permission 2004-1 for gravel mining and excavation activities within Humboldt County. National Marine Fisheries Service, Southwest Region.
- [NMFS] National Marine Fisheries Service. 2004b. Biological Opinion for batched consultation, Mad River individual permits. National Marine Fisheries Service, Southwest Region.
- [NRM] Natural Resources Management. 2007. Final report 2005-2006 fisheries monitoring program for gravel extraction operations on the Mad, Eel, Van Duzen, South Fork Eel, and Trinity rivers. Eureka (CA): Natural Resources Management.
- Stillwater Sciences. 2008. Draft 2007 fisheries monitoring program report for gravel extraction operations on the Mad, Eel, Van Duzen, South Fork Eel, and Trinity rivers. Arcata (CA): Humboldt County Gravel Operators.
- Trush, B. 2008b. Lower Mad River anadromous salmonid habitat trend between WY1994 and WY2007.
- Stillwater Sciences. 2009. Batched biological assessment for aggregate extraction operations in the lower Mad River, Humboldt County, California. Mad River and Gravel, Granite Construction, Eureka Ready Mix, Mercer-Fraser Company, and D&R Miller.
- [NMFS] National Marine Fisheries Service. 2010. Biological Opinion – Mad River batched gravel mining. National Marine Fisheries Service, Southwest Region.

Much could be written to describe salmonid life history but the following sections are limited to brief descriptions of the species' four life stages: adult upstream migration, spawning and egg development, fry and

juvenile rearing, and smolt outmigration. The focus then changes to fisheries habitat trends over time in the last fisheries section.

#### 3.2.4.1 Southern Oregon, North Coastal California Coho ESU

California coho salmon life history is typified by four life stages (CDFG Undated):

Adult upstream migration: "Adult coho salmon enter fresh water from September through January to spawn. Coho salmon move upstream after heavy rains have opened the sand bars that form at the mouths of many California coastal streams, but may enter larger rivers earlier." On the Klamath River, coho begin entering in early to mid-September, reaching a peak in late September to early October. On the Eel River, adult coho salmon return 4 to 6 weeks later than on the Klamath River. In the upper reaches of these streams, spawning generally peaks in November and December, but timing varies by stream and/or flow (CDFG Undated).

Spawning and Egg Development: "In California, spawning occurs mainly from November to January, although it can extend into February or March if drought conditions are present... In the Klamath and Eel rivers, spawning occurs in November and December. Females usually choose spawning sites near the head of a riffle, just below a pool, where the water changes from laminar to turbulent flow and there is a medium to small gravel substrate. The flow characteristics through the redds [fish eggs' "nests"] usually ensure good aeration of eggs and embryos, and the flushing of waste. Larger coho salmon produce more eggs and there is a definite tendency for fecundity [reproductive success] to increase from California to Alaska. In California, eggs incubate in the gravels from November through April. The incubation period is [shorter if water temperature is higher]... California coho salmon eggs hatch in about 48 days at 48°F, and 38 days at 51.3°F. After hatching, the alevins (hatchlings) are translucent in color. This is the coho salmon's most vulnerable life stage, during which they are susceptible to siltation, freezing, gravel scouring and shifting, desiccation, and predation. Alevins remain in the interstices of the gravel for 2 to 10 weeks until their yolk sacs have been absorbed, at which time their color changes to that more characteristic of fry. The fry are silver to golden with large, vertical, oval, dark parr marks along the lateral line that are narrower than the spaces between them" (CDFG Undated).

Fry and juveniles rearing: "Fry emerge from the gravel between March and July, with peak emergence occurring from March to May... They seek out shallow water, usually moving to the stream margins, where they form schools. As the fish feed heavily and grow, the schools generally break up and individual fish set up territories. At this stage, the fish are termed parr (juveniles). As the parr continue to grow and expand their territories, they move progressively into deeper water until July and August, when they inhabit the deepest pools. This is the period when water temperatures are highest, and growth slows. Rearing areas used by juvenile coho salmon are low-gradient coastal streams, lakes, sloughs, side channels, estuaries, low-gradient tributaries to large rivers, beaver ponds, and large slackwaters. The most productive juvenile habitats are found in smaller streams with low-gradient alluvial channels containing abundant pools formed by large woody debris. Adequate winter rearing habitat is important to successful completion of coho salmon life history" (CDFG Undated).

Smolt outmigration: "After one year in fresh water, smolts begin migrating downstream to the ocean in late March or early April. In some years, [outmigration] can begin prior to March and can persist into July. Peak downstream migration in California generally occurs from April to early June. Factors that affect the onset of [outmigration] include the size of the fish, flow conditions, water temperature, dissolved oxygen (DO) levels, day length, and the availability of food. Low stream productivity, due to low nutrient levels or cold water temperatures, can contribute to slow growth, potentially causing coho salmon to postpone outmigration.

There may be other factors that contribute to a freshwater residency of longer than one year, such as late spawning, which can produce fish that are too small at the time of smolting to migrate to sea. The amount of time coho salmon spend in estuaries... is variable, and the time spent there is less in the southern portion of their range [such as Northern California]. Upon entry into the ocean, the immature salmon remain in inshore waters, congregating in schools as they move north along the continental shelf. Most remain in the ocean for two years; however, some return to spawn after the first year, and these are referred to as grilse or jacks. Data on ocean distribution of California coho salmon are sparse, but it is believed that the coho salmon scatter and join schools from Oregon and possibly Washington" (CDFG Undated).

#### 3.2.4.2 Northern California Steelhead

Steelhead are reported to exhibit the most complex and variable life history of the Pacific salmonids. They can be freshwater resident or anadromous; the anadromous steelhead can spend up to 7 years in fresh water before smolting, and then up to 3 years in the ocean before first spawning (NOAA 1996). Further, they are classified into two types, the summer steelhead (that matures in freshwater, requiring several months to mature and spawn), and the winter steelhead (that matures in the ocean, entering fresh water ready to spawn). The Mad River supports both summer and winter steelhead.

Adult upstream migration: Adult upstream migration times can overlap considerably between the summer and winter runs of steelhead, as indicated in Table 3-16.

**Table 3-16. Steelhead upstream migration and spawning periods (NMFS 2004a)**

| Steelhead Run | Adult Upstream Migration Period | Spawning Period |
|---|---|---|
| Summer steelhead | Enter fresh water between May and October, hold in deep pools during summer/fall, overwinter in larger rivers, then resume migration in early spring. | January and February |
| Winter steelhead | Enter fresh water between November and April. In smaller coastal streams, some enter in spring right before spawning. | April and May |

Spawning and egg development: Steelhead can spawn more than once before dying, unlike Pacific salmon. Intermittent streams may be used for spawning, and cover is important because steelhead can enter streams weeks before they spawn. Summer steelhead utilize habitat that is not fully utilized by winter steelhead, and often spawn farther upstream than winter steelhead (NMFS 2004a). Steelhead egg incubation time is dependent on water temperature, varying from 1.5 to 4 months, generally between February and June.

Fry and juveniles: Fry inhabit shallow water along banks of perennial streams. Summer rearing occurs in "faster parts of pools" (NMFS 2004a). Winter rearing occurs across a wide range of fast and slow velocity habitats, but is characterized primarily by complexity such as large in-stream wood. Larger and older juveniles will move downstream to rear in larger tributaries and the mainstem. "Rearing is usually 2 years in California ESUs" (NMFS 2004a).

Smolt outmigration: Smolting and outmigration occurs in March and April. Winter steelhead generally smolt after two years in freshwater. They tend to migrate directly offshore, rather than "migrating along the coast... as salmon do" (NMFS 2004a).

#### 3.2.4.3 California Coast Chinook Salmon ESU

Chinook salmon runs are designated by adult upstream migration timing. Spring-run Chinook are now only found on the Rogue, Klamath, and Trinity rivers. The Mad River supports "sizeable populations" of fall-run Chinook salmon (NMFS 2004a), however, the species listing status is "threatened" and Critical Habitat has been designated.

Adult upstream migration: Timing depends on the size of the river (NMFS 2004a). In the larger river systems (Rogue, Upper Klamath, and Eel), fall-run Chinook return to fresh water in August and September. In coastal rivers (presumably including the Lower Mad River), the fall-run begins in late October.

Spawning and egg development: On the larger river systems, spawning occurs in late October and early November. In smaller coastal rivers like the Lower Mad River, the peak spawning period is during late November into December, and often extending into January. Eggs resulting from the fall run spawning incubate and emerge from December into mid-April. Although the Chinook salmon ESU covers naturally spawned populations, worthy of mention is the Mad River Hatchery fall-run program.

Fry and juveniles: Fry use woody debris and cobble interstitial spaces as cover, but as they grow their habitat preferences change to deeper water with slightly higher velocity. "Data from the Mad River... indicate that emergent Chinook salmon fry develop rapidly following emergence... The months of May and June accounted for 91.5% of the total capture of migrating young-of-the-year Chinook salmon in 2001" (Sparkman 2002, as cited by NMFS 2004a).

Smolt outmigration: Chinook populations south of Cape Blanco generally outmigrate to the ocean as sub-yearlings. The proportion of smolting sub-yearlings to yearlings varies, however. In smaller river systems, low flows, high temperatures, and barrier bars that form at the estuary mouth would tend to favor smolting sooner rather than later. Fry migrants generally migrate at 50 to 150 days after hatching, and "fingerling migrants which migrate in the late summer or autumn of their first year, represent the majority of emigrants" (NMFS 2004a).

#### 3.2.4.4 Salmonid Habitat Trends

This section is based on a trend analysis of salmonid habitat performed by Trush (2008b). The complete report is found in Appendix C; much of this section is excerpted verbatim from that report, and such text is identified by double quote marks.

> "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 Sciences 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 Sciences (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."

The primary objective of the Trush (2008b) analysis was to document trends in anadromous salmonid habitat abundance between WY1993 and WY2007. The methodology was similar to that of the 2008 riparian vegetation analysis (Trush 2008a); aerial photography was examined and salmonid habitat was delineated on the photographs. Limited field studies were performed to verify the habitat areas mapped on the photos. By mapping salmonid habitat areas, the study attempted to determine how habitat conditions have changed during the CHERT program.

In the 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."

Results from Trush (2008b) indicated a dramatic decline in juvenile 1+ coho habitat area from the mid-1940s to the mid-1960s, possibly resulting from large floods of the 1950s and 1960s. Then, after a recovery in habitat through the 1970s and 1980s, juvenile 1+ coho habitat abundance since WY1994 (since the CHERT adaptive management program began) has trended slightly upward (Figure 3-1).

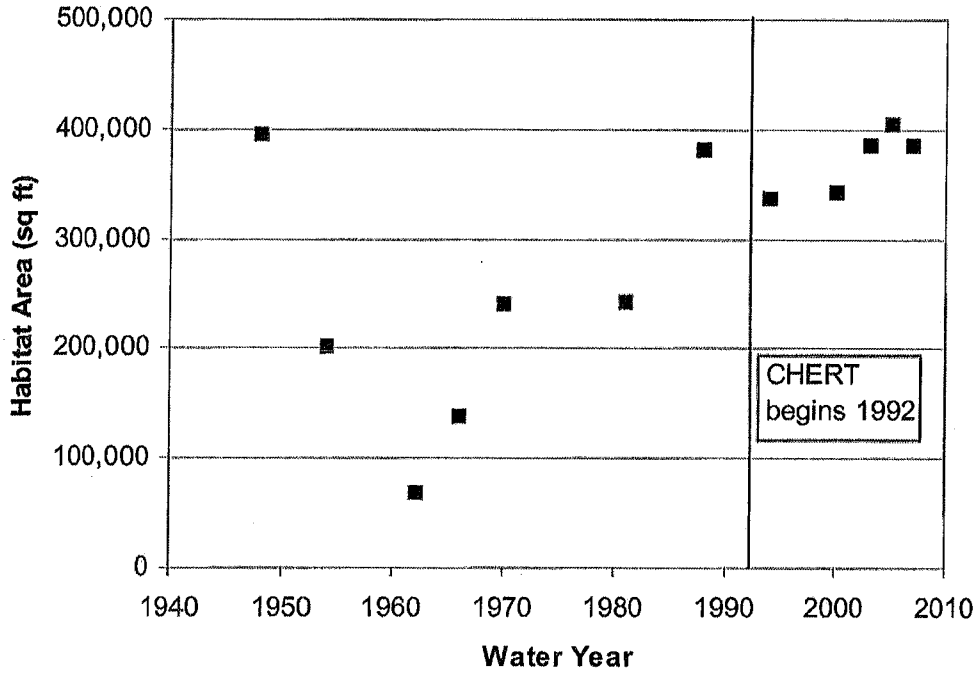


**Figure 3-1. Estimated juvenile 1+ coho rearing habitat has generally increased in the Lower Mad River between WY1948 and WY2007, from the Highway 101 bridge upstream to the Blue Lake bridge.**

Trush (2008b) also found that the area of juvenile 2+ steelhead rearing habitat has remained approximately steady since WY1994 except for an abrupt increase in 2007 (Figure 3-2).

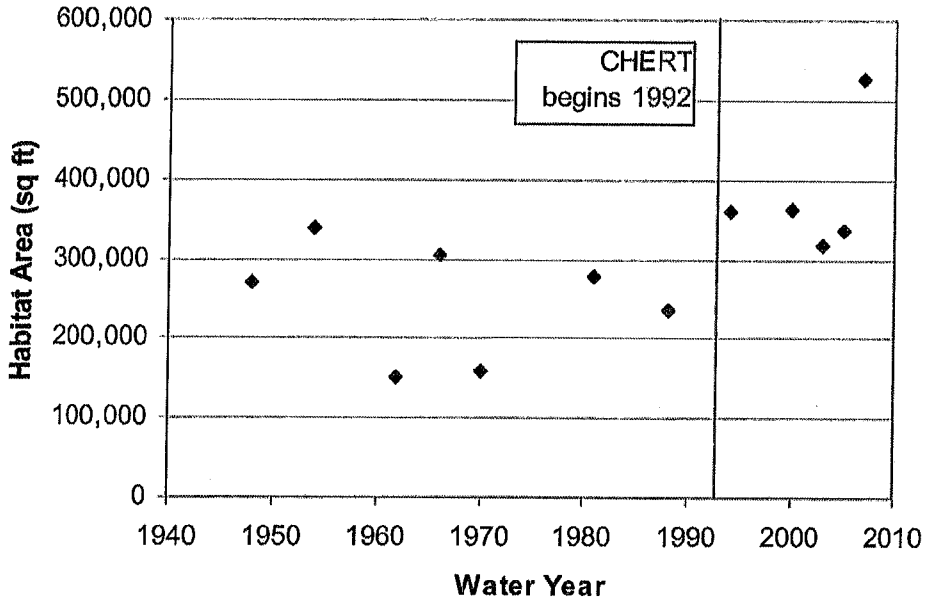


**Figure 3-2. 2+ juvenile steelhead rearing habitat has remained relatively constant historically and since CHERT began.**

Adult salmonid holding habitat area ($ft^2$) has been variable since CHERT began (Figure 3-3). Trush (2008b) states that "Following the high floods in WY1995 through WY1997, mainstem alignment abandoned a few deep pools and consequently decreased adult holding habitat availability. Since approximately WY2000, adult holding habitat seems to be increasing although inter-annual variability is considerable."

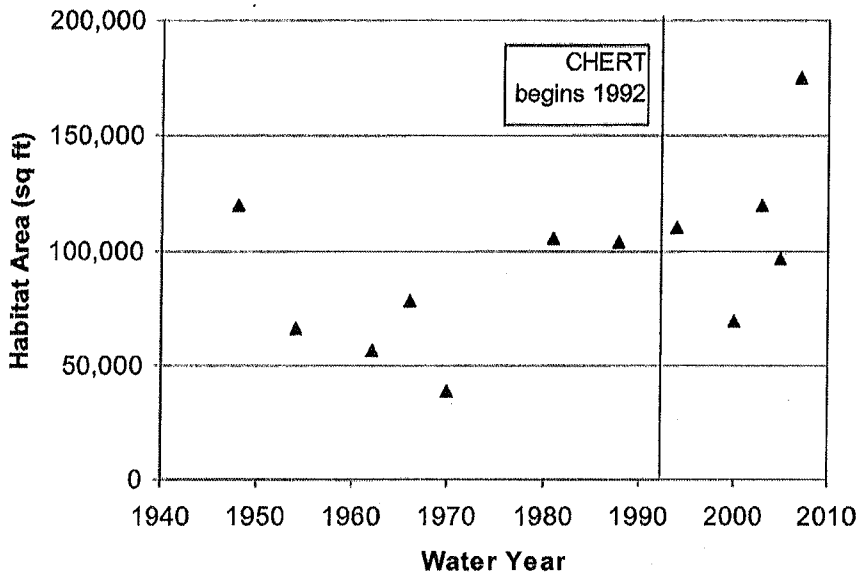


**Figure 3-3. The adult salmonid holding habitat area (ft2) has varied considerably since CHERT began but has generally increased since the 1950s.**

Trush (2008b) summarizes anadromous salmonid habitat for the three life stages by observing that habitat area increased from the 1960s to the 1990s, but since CHERT began in 1992, increases have not been dramatic or constant, as indicated in Figure 3-4.

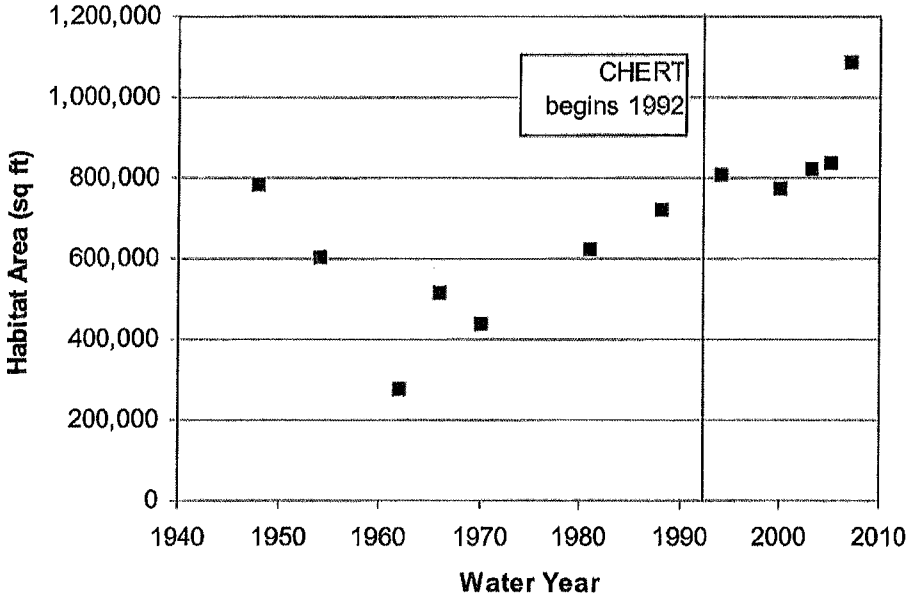


**Figure 3-4. Total habitat area (ft²) for 3 life stages (1+ coho rearing, 2+ steelhead rearing, and adult salmonid holding) has increased since the 1960s.**

One of the reasons for establishing CHERT in 1992 was the perception that aggregate extraction was the primary cause for salmon and steelhead habitat loss and impairment. The analyses to date do not prove or disprove that perception. However, since the CHERT program began, habitat area has never decreased to values of the historical lows occurring in the 1960s and 1970s. Whether this is due to the activities of CHERT, or whether habitat area increases would have occurred anyway, is impossible to know with certainty.

Another question in the early years of the CHERT program was whether extraction creates or increases the shallow water depths over transverse bars, which in turn can create fish passage barriers. Continuing the annual surveys that document riffle crest depths is advised, but those measurements alone will not definitively determine whether extraction or CHERT activities has any effect on fish passage barriers. CHERT's policy of avoiding skimming near the heads of point bars reduces potential channel widening, which might also decrease the occurrence of transverse bars. Current practices utilize narrower skims and higher elevation extraction floors, which increase low flow channel confinement and are likely improving fish passage.

In general, "there has been modest, overall improvement [in habitat area of the three salmonid life stages] since 1994 and significant improvement compared to habitat abundance in the 1950s through early 1980s" (Trush 2008b). Except for a very recent increase in anadromous salmonid habitat in 2007, habitat area has recovered to pre-1955 and 1964 flood levels and remained fairly constant over the span of CHERT adaptive management. From this we can conclude that major historic floods dominate habitat changes and that any effects of the present extraction program are relatively small or non-existent.

#### 3.2.4.5 Longfin Smelt

The 2009 "Status Review" of the longfin smelt is the most current and thorough description of the longfin smelt that is readily available (CDFG 2009b). Another source is Moyle (2002); these two documents are the sources for the following information.

Longfin smelt live in waters with a wide range of salinities, and are anadromous. Its range includes Humboldt Bay but none have been documented in the Mad River (see Table 6 in Moyle 2002). They have been documented in tributaries of Humboldt Bay, and they have been documented outside of Humboldt Bay, at a dredge disposal site located 2 miles offshore. Because they are known to occur in Humboldt Bay and offshore, they could also occur in the Mad River estuary.

Distribution and life cycle timing have not been evaluated in the Mad River. Spawning occurs primarily in "late fall, winter, spring, and (rarely) early summer" (CDFG 2009b); spawning months are November through April. Based on its documented distributions in other rivers, the period of high longfin smelt larva abundance is in January through March. Catch of longfin smelt is much reduced during June through November (see Table 1 in CDFG 2009b).

Factors affecting longfin smelt abundance include:

- Previous abundance. In the Mad River, no abundance estimates are available.
- Habitat. Sand is likely its preferred spawning substrate in California, and spawning location depends on the boundary between fresh and brackish water. Temperature requirements for spawning are 13 to 16°C (55.4 to 60.8°F); incubation temperatures are 9 to 11°C (48.2 to 51.8°F).
- Top-down factors. Included in "top down" factors are surface water diversions, predation, scientific collections, and commercial fishing bycatch. The Humboldt Bay Municipal Water District's

(HBMWD's) surface diversion is the primary surface diversion on the lower Mad River, but its intake is in freshwater and is outside the scope of the proposed project. HBMWD's operations could affect longfin smelt by affecting summer flows; studies to investigate this are currently in planning stages. Commercial fishing is also outside the scope of the proposed project, but it does not occur within the lower Mad River. Predation is a factor that could occur in the Mad River; piscivorous fish (fish that eat other fish) include salmonids, which are present in the Mad River.

- Bottom-up factors. Included in "bottom up" factors is food limitation; effects on primary and secondary production could affect longfin smelt.
- Climate change. Loss of estuary habitat due to increased freshwater flows in summer; shorter spawning periods due to warmer water temperatures.

Although longfin smelt have not been documented within the Mad River or its estuary, the possibility of their spawning and rearing there is a reasonable assumption. The life cycle, distribution, and habitat requirements of longfin smelt are summarized in Table 3-17.

**Table 3-17. Longfin smelt requirements**

| Longfin Smelt Requirements by Life Stage | Conditions in Lower Mad River |
|---|---|
| Spawning in November to April, sandy substrate, temperatures 13 to 16°C (55.4 to 60.8°F) | Elevated temperatures are not likely to occur in November to April. Gravel extraction generally begins no earlier than mid-June |
| Incubation and rearing in January through March, incubation temperatures 9 to 11°C (48.2 to 51.8°F) | Elevated temperatures are not likely to occur in November to April. Gravel extraction generally begins no earlier than mid-June |
| Juvenile and adults uncommon in summer in Sacramento-San Joaquin Delta | Although not documented, juveniles and adults likely uncommon in the lower Mad River too |

### 3.2.4.6 Comments on Fisheries Factors

NMFS, CDFW, and CHERT scientists have discussed various aspects of wildlife resources, in meetings, comment letters, and responses to comment letters, which are summarized in Table 3-18.

**Table 3-18. Comments on fisheries factors and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| Salmonid spawning habitat decreasing since 2004 (Stillwater Sciences 2009) is a concern. Coho juveniles "are using the mainstem" and that "juveniles are trying to rear in the mainstem." Because adults will generally return to spawn where they rear, and because spawning habitat is decreasing, there is concern that sustained yield extraction could affect coho populations. For such impacts, mitigations such as installing LWD structures, would be required. | • A period of 5 years is too few to constitute a trend, and the current approach covers a longer time scale<br>• A cause and effect relationship cannot be assumed. If a spawning area decrease is occurring, it may not be associated with sustained yield extraction, but instead due to differences in measuring methods, and an increase in fines that decreased spawning areas.<br>• Historically, the mainstem has not been good coho habitat, even in the 1940s. If more coho juveniles are now in the mainstem, the explanations could range from tributary conditions have deteriorated such that juveniles are moving to the mainstem, to tributary conditions are so favorable that an unusually high number of juveniles are moving to the mainstem.<br>• On a river-wide and watershed scale, the lower Mad River is much less important to coho rearing, compared with the upper river and Mad River tributaries. | No | July 23, 2009 meeting between NMFS and CHERT |

The spawning area data are generally not comparable from year to year, at least in the range from 2004 to 2008. In reviewing the data supporting spawning area decreases, a number of considerations were included by the authors (Stillwater Sciences 2009):

> "Salmonid spawning habitat appears to have decreased... between 2004 and 2008... It is unknown exactly why such a steady decline in spawning habitat has occurred since 2004. However, part of this loss may have been an artifact of the inclusion of secondary channels into the data set during 2006 through 2008. Secondary channels typically have much less suitable spawning habitat than the mainstem, and thus their inclusion adds more survey distance and less habitat area. In addition, a distinct fining of the spawning substrate was noticed during the 2008 monitoring effort. A significant amount of small gravel and sand were [sic] observed in what typically would have been suitable spawning locations... Another partial explanation might be the channel shift observed between 2004 and 2008, which abandoned spawning areas."

#### 3.2.4.7 Summary of Present and Possible Future Conditions

The present and possible future conditions for the relevant fish species are summarized in Table 3-19.

**Table 3-19. Fish species summary of present and possible future conditions**

| Species | Present Conditions | Possible Future Conditions |
|---|---|---|

| Species | Present Conditions | Possible Future Conditions |
|---|---|---|
| Southern Oregon, North Coastal California coho ESU<br><br>Northern California steelhead<br><br>California Coast Chinook salmon ESU | Based on habitat area within the Lower Mad River, present conditions are better for these species than in the past. Species requirements are specific to life stage, but in general habitat areas for juveniles and adult holding have either increased or remained constant. | Future salmonid habitat conditions in the Lower Mad River are difficult to anticipate. Based on recent habitat area delineations that were representative of time periods under the Proposed Project, fisheries habitat area should either remain the same or increase slightly. |
| Longfin smelt | Longfin smelt have not been documented within the Mad River, but are present in Humboldt Bay, its tributaries, and in the ocean 2 miles offshore. Based on these data, longfin smelt are likely present in the lower Mad River under conditions similar to those in Humboldt Bay and its tributaries. | Based on factors likely affecting longfin smelt, conditions could improve. Commercial fishing off the coast is much decreased. Salmonid predation could also be much decreased, due to decreases in salmonid populations. |

### 3.2.5 Definition of Significance and Baseline Conditions

Definitions of significant impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Using these guidelines, six criteria define a potentially significant impact on biological factors. A project's effects are potentially significant if the project will:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, by CDFW, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or U.S. Fish and Wildlife Service?
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The environmental baseline is considered to be 1992 conditions; therefore full mitigation and avoidance of substantial adverse effect is defined as measures that return sites to at least 1992 conditions. We note that 1992 conditions were not pristine, due to impacts on the river from gravel extraction prior to CHERT, and from land uses in the watershed such as timber production, grazing, residential housing, and transportation. Thus, 1992 conditions are far from pre-European settlement conditions, but serve as a baseline from which to judge the effects of gravel extraction since the early 1990s and of the adaptive management program.

CHERT and CDFW scientists have not reached consensus on whether 1992 conditions is an appropriate baseline, as previously described in Table 3-6. In comments on the January 2009 Draft SPEIR and during a meeting between CHERT, the County, and CDFW (30 June 2009), CDFW noted that CHERT had documented that riparian area has remained about the same since 1992; CDFW stated that under the CHERT adaptive management program, the "riparian regime" is maintained but not improved. CDFW questioned whether the goal of the adaptive management program should be to improve the riparian regime, and not be satisfied with meeting 1992 conditions.

In the 30 June 2009 meeting, CHERT scientists questioned: 1) what a desired riparian condition would be, given the disturbance ecology of the lower Mad River, and 2) whether gravel extraction techniques should be expected to improve riparian conditions that result from watershed-wide land uses. CDFW did not offer an alternative baseline, but reiterated that meeting 1992 conditions would result in "a riparian regime that is maintained but not improved."

Establishing a baseline is critical in this document's impact determination analysis. However, if riparian and aquatic habitat conditions must improve to better but undefined conditions for the Proposed Project to be considered without significant impact, yet the adaptive management program does not have the authority or responsibility for all land uses that contribute to habitat impact, then the Proposed Project could be determined to cause significant impacts regardless of changes in the project operations or additional mitigation measures.

Therefore, to move forward in this CEQA process, a biological baseline of 1992 conditions has been maintained, recognizing that scientific consensus has not been reached.

It is possible that future geologic and hydrologic conditions could change such that even though site specific mitigation measures and sustained yield management plans are implemented, a significant biological effect could occur. If this happens, the CHERT adaptive management team would try to discover how or why adverse effects continue to occur, and what actions the extraction operators could take to reduce their contribution to the adverse effect(s). Communication and decision-making with the CHERT program stakeholders would occur as described in the Proposed Project description.

## 3.3 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 a summary of a more detailed description of the geologic environmental setting that is provided in Appendix D. This section also includes CDFW's and NMFS' comments and responses on the above reports and on the 2009 Draft Supplemental Programmatic EIR.

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 A). With the publishing of Lehre et al. (2009), this comment has been addressed.

### 3.3.1 Concept of Sustained Yield Extraction

Sustained yield extraction, a concept that is accepted by CHERT scientists, appears to be acceptable to NMFS scientists based on issuance of their July 2010 Biological Opinion, but is not readily accepted by CDFW scientists based on their comments to the 2009 Draft Supplemental PEIR. 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.

To estimate the extractable volume that maintains a sustained yield extraction rate, CHERT and NMFS have created two definitions. CHERT defines sustained yield extraction as some percentage of the Mean Annual Recruitment (MAR). NMFS defines sustained yield extraction as Fractional Extraction Volume (FEV), which is estimated using a spreadsheet calculator developed by NMFS. Differences between the sustainable fraction of MAR and FEV may be important to the long term volumes of extractable gravel, as summarized in Table 3-20.

**Table 3-20. Sustainable yield concept is supported by both MAR and FEV**

| Sustained Yield Concept | 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 a percentage of the MAR | Yes, extraction can be sustainable "if the annual extractions had varied with the annual recruitment level" |

| Sustained Yield Concept | Mean Annual Recruitment (MAR) | Fractional Extraction Volume (FEV) |
|---|---|---|
| How estimated | Various methodologies and studies as summarized Table 4-21 | A spreadsheet calculator developed by NMFS (2010) |
| Source | 2009 Draft Supplemental PEIR | July 2010 BO |

Sustained yield extraction is a concept accepted by both CHERT and NMFS, but the volumes extracted, and extraction rates, are not agreed upon by CHERT and NMFS.

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. CHERT scientists believe that we can measure MAR changes only on decadal, not annual, 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. The MAR concept allows us to quantify a sustainable 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 percentage of MAR in reaches with excess bed material
- Confirmed by topographic data that indicate aggradation within or downstream of the subject reach. If aggradation 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

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, as detailed in Table 3-21; 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 3-21. 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 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 and Lutrick. 2001 | Eureka Ready Mix | COE's cross section surveys in 1970 and 1999 | 270,000 |
| Knuuti and McComas. 2003 | COE | COE's cross section surveys in 1970 and 2000 | 112,000 (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 (yd³/ year) |
|---|---|---|---|
| Lehre et al. 2005 | Gravel operators through CHERT program | Operators' cross sections from 1993 to 2003 | 135,000 to 155,000 |
| Lehre 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.

In the July 23, 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 yd³/yr for the upstream reach and 50,000 – 70,000 yd³/yr for the downstream reach, or a total of 135,000 – 155,000 yd³/yr for the entire river. Given the uncertainties in this approach, the current average extraction of 175,000 yd³/yr is not unreasonable, but certainly appears to be an upper limit. The 270,000 yd³/yr that Kondolf and Lutrick (2001) suggest might be extracted appears much too high, while the 112,000 yd³/yr suggested by Knuuti and McComas (2003) is probably unnecessarily low."

In the July 23, 2009 meeting, 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. Since then, NMFS scientists have developed their method of estimating FEV, using an extraction upper limit of 175,000 yd³/yr during "high recruitment years" and a lower limit of 72,000 yd³/yr during "low recruitment years."

### 3.3.2 Channel Aggradation, Degradation, and Confinement

In the 1994 PEIR, many geomorphic 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.

The information in this section provides support for whether the impacts listed in the 1994 PEIR have been mitigated since 1994 and the creation of the CHERT adaptive management program. Graphs of cross sections' changes are provided in Appendix D; interpretations of the graphs and other data are provided here.

Since the mid-1990s, downstream bars have generally aggraded (elevation of channel bed has increased), while upstream bars have degraded (channel bed elevation has decreased). Based on longitudinal profiles, 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.

Channel confinement is indicated by the differences between the mean and thalweg elevations; the greater the difference, the greater the channel confinement. Since the late 1990s, channel confinement was not consistently increasing or decreasing, as measured by the differences in mean and thalweg elevations.

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 3 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 the entire 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."

### 3.3.3 Channel Stability, Bank Erosion, and Channel Width

As metrics 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 500 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, as shown in Figure 3-5.

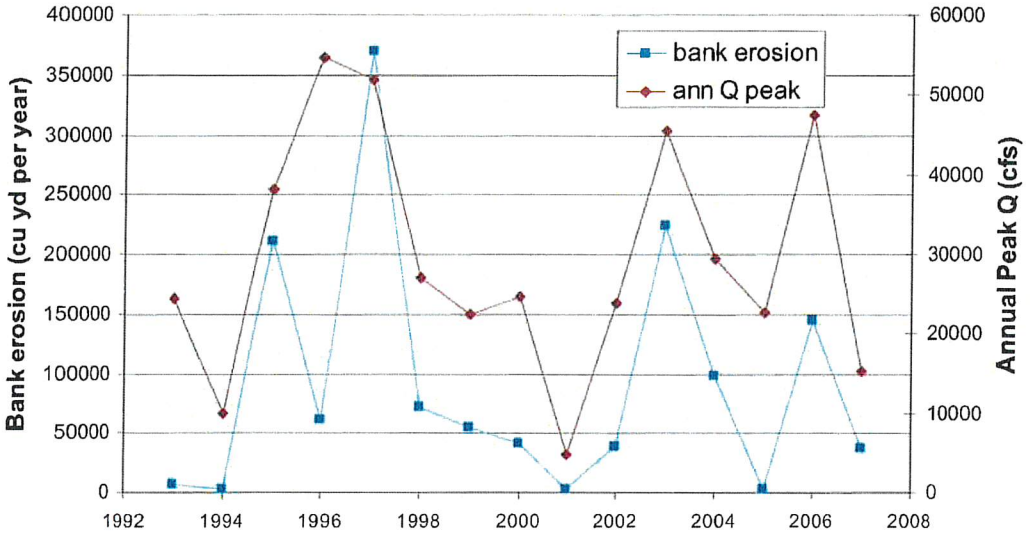


**Figure 3-5. Bank erosion is generally related to annual peak flows on the lower Mad River during 1993 to 2007 (adapted from Lehre et al. 2009). An exception occurred during 1996 when the peak flow was high but bank erosion was relatively low.**

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).

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, which is illustrated in Figure 3-6. At the downstream bars, where the channel is bounded by erosion-resistant banks, channel width remained relatively constant.

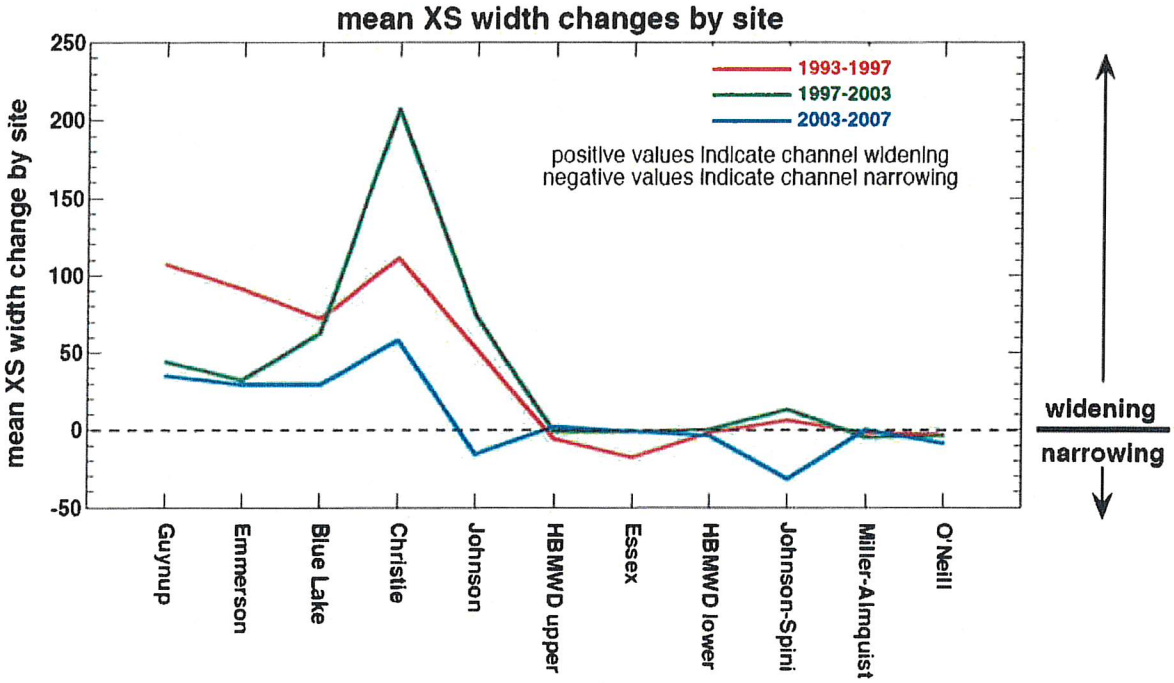


**Figure 3-6. Upstream sites from Johnson to Guynup bars exhibit channel widening, whereas the width of downstream sites, from HBMWD to O'Neill bars, remain unchanged (Lehre et al. 2009)**

Channel enlargement is a metric that NMFS scientists have focused on as an indicator of extraction effects, as shown in Figure 3-7. "The figure [Figure 3-7] shows overall enlargement in the upper extraction reach, which is the area above 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).

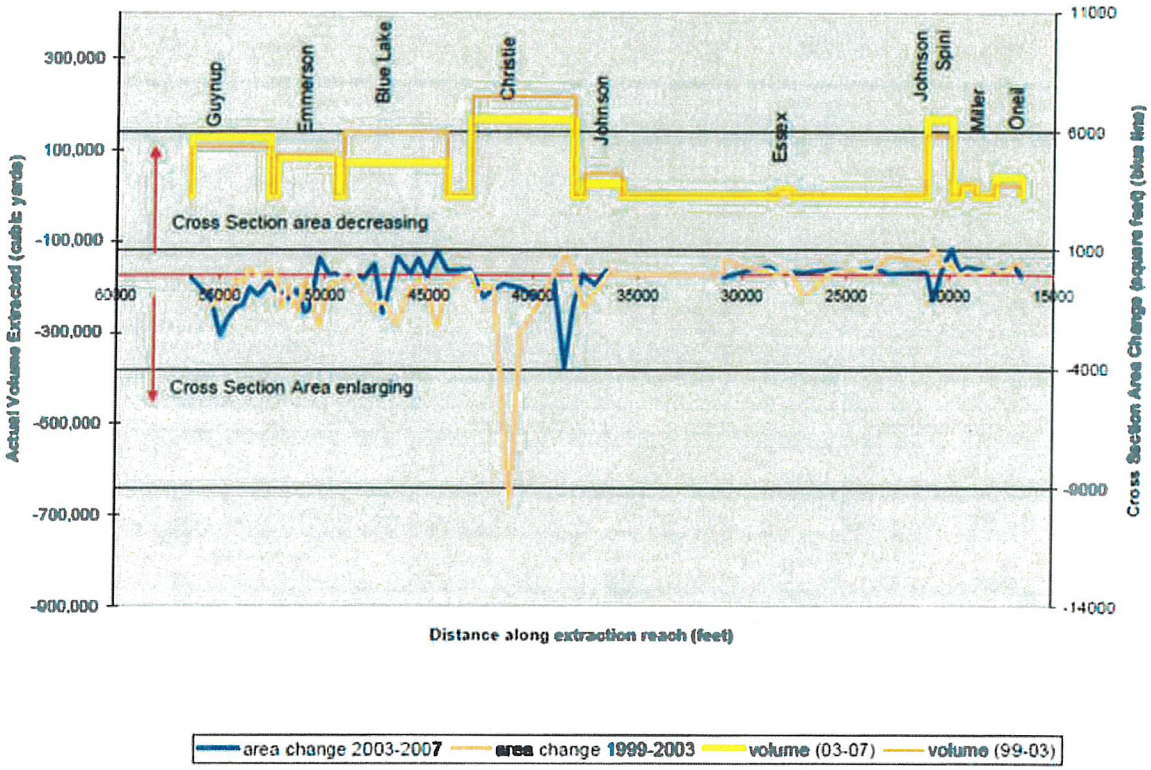


Figure 9 Changes in Cross Sectional Area in two 5-year periods, 1999-2003 and 2003-2007.

**Figure 3-7. 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 from Figure 3-7. 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 (Figure 3-8) and indicate decreasing confinement at the downstream sites such as Johnson-Spini to O'Neill sites.

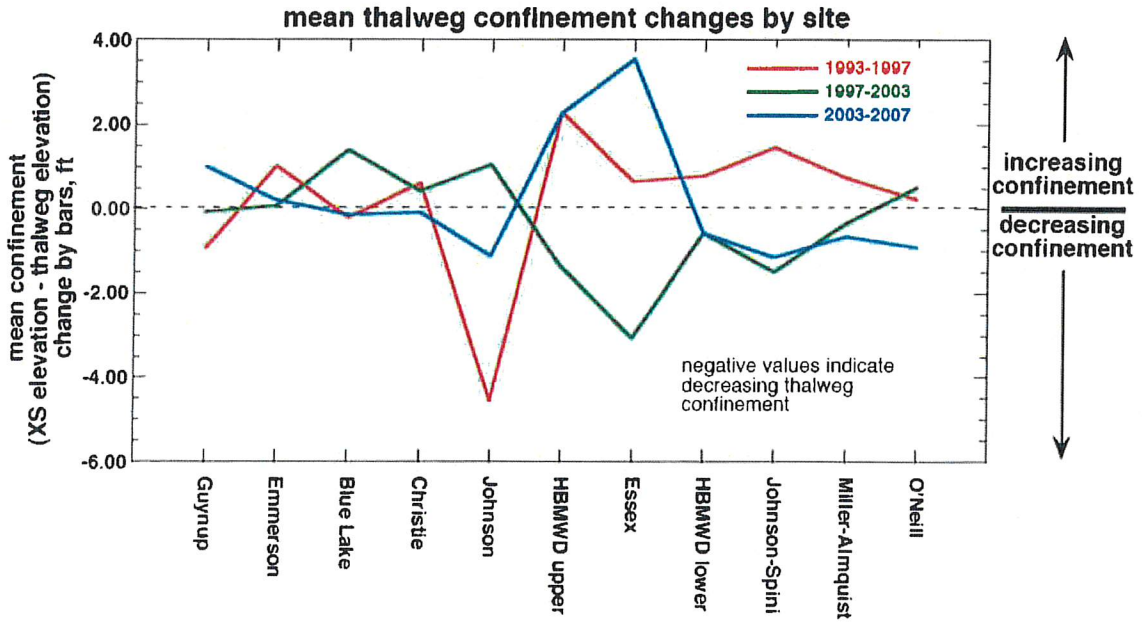


**Figure 3-8. At the downstream bars (from O'Neill to Johnson bars), mean confinement decreased from the period 1993–1997 to 1997-2007 (Lehre et al. 2009)**

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).

### 3.3.4 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 cannot 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).

### 3.3.5 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, as noted in Table 3-22. Further, since 1993, most of the extraction occurs at the upstream sites, see Figure 3-9)

**Table 3-22. 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 | |
| 1960-1992 | 33 | 425,000 | HCPBD 1994 |
| 1982-1991 | 10 | 286,000 | |
| 1993-2007 | 11 | 164,000 | CHERT records |

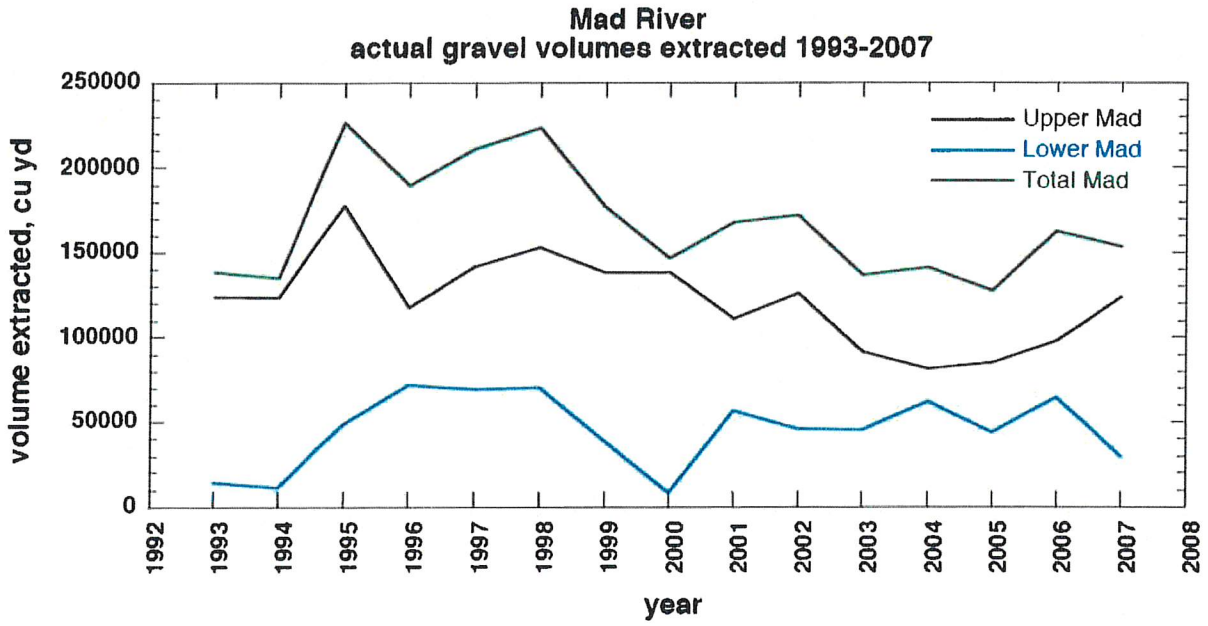


**Figure 3-9. Most gravel extraction occurs at the upstream sites, which include Guynup, Emmerson, Blue Lake, Christie and Johnson bars (Lehre et al. 2009). The lower sites include Essex, Johnson-Spini, Miller-Almquist, and O'Neill bars.**

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."

### 3.3.6 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 wetland 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 4.2.3.4). 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 C). 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.

### 3.3.7 Comments on Geologic and Hydrologic Factors

NMFS, CDFW, and CHERT scientists have discussed various aspects of geologic factors, in meetings, comment letters, and responses to comment letters, as summarized in Table 3-23.

**Table 3-23. Comments on geologic resources and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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 | This section contains an analysis of channel widths and areas at a reference (unmined) bar (Leavey Bar) and Christie Bar (a mined bar). The comparison 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. | Possibly. Monitoring of a reference bar is not required in the 2010 BO. | March 16, 2009 NMFS comments on 2009 Draft SPEIR<br><br>CHERT responses to comments 2009 Draft SPEIR |

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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? | The value of the MAR estimate is that it sets an upper limit to a sustained yield extraction volume<br><br>MAR volume is dependent on large flows, land uses in the watershed, and the erosion resistance of bank materials. MAR is not a function of extraction | Possibly | March 16, 2009 NMFS comments on 2009 Draft SPEIR |
| We recommend including a detailed definition of both the MAR and sustained yield concepts | These are included in this section. | Possibly | March 16, 2009 NMFS comments on 2009 Draft SPEIR |
| The statement that "if gravel extraction remains below the MAR, long-term cumulative effects will likely remain less than significant" needs some further explanation | This statement has been revised to include that extraction technique is as important as volume. | Possibly. FEV also relies on sustainable extraction concept | March 16, 2009 NMFS comments on 2009 Draft SPEIR<br><br>NMFS July 2010 BO |
| Gravel mining tends to significantly increase bank-full channel widths, which leads to reduced pool depths (Brown et al. 1998) | The literature cited by CDFW describes a site where mining was much in excess of sustained yield extraction; therefore, the conditions described in the literature do not apply to conditions on the lower Mad River.<br><br>NMFS' analysis of channel widening concludes that "annual gravel extraction at rates in excess of estimated annual recruitment has caused channel enlargement..." | No | CDFW 2009 comment letter<br><br>NMFS July 2010 BO |

### 3.3.8 Summary of Present and Possible Future Conditions

The present and possible future conditions for geologic factors are summarized in Table 3-24.

**Table 3-24. Summary of geologic and hydrologic present and possible future conditions**

| Metrics | Present Conditions | Future Conditions |
|---|---|---|

| Metrics | Present Conditions | Future Conditions |
|---|---|---|
| Channel aggradation and degradation | At upstream sites, channel elevations are generally decreasing; at downstream sites, they are generally increasing. | Difficult to anticipate because effects will be influenced by future flow regimes. However, because sustained yield management appears to have reversed historical channelbed degradation, further degradation should be low or non-existent by adhering to sustained yield and adaptive management. Many banks are still highly vulnerable to bank erosion, and will erode during large storms regardless of sustained yield gravel extraction. Reversal of channel bed degradation should eliminate any potential groundwater effects.<br><br>Due to river dynamics, the opportunity to construct gravel pit wetlands and alcoves will continue to increase and decrease. Whether these techniques will be modified is dependent on studies performed within the scope of the adaptive management program. Habitat created by LWD could be increased if LWD could be protected from the public |
| Channel stability, bank erosion, and channel width | Bank erosion is generally related to annual peak flows. Channel width can change dramatically and quickly from site to site. | |
| Downstream hydrology | The CHERT adaptive management program does not affect precipitation, flow magnitude and timing, flood frequencies, or water diversions, but could affect local (immediate vicinity) groundwater elevations. | |
| Site specific effects | Constructing gravel pit wetlands and alcoves are current extraction techniques that increase riparian and wildlife habitat, yet may also provide bullfrog habitat. | |

### 3.3.9 Definition of Significance and Baseline Conditions

For geologic and hydrologic significance definitions, CEQA's Appendix G checklist is not too helpful. Most of the geologic impacts covered in the CEQA checklist are associated with seismic hazards. Because the CHERT adaptive management program does not affect seismic hazards, those impacts are not further discussed. The CEQA checklist does provide guidance for soil impacts, which is "Would the project... result in substantial soil erosion?" The preparers of the CEQA checklist must then decide what constitutes "substantial" soil erosion, either as a quantitative measure or a qualitative description. For this project, evaluation of soil erosion (extending the impact to include bank and bed erosion) would not cover the other geomorphic and ecological impacts from gravel extraction and the adaptive management program that manages the extraction. Therefore, another definition of significance is needed.

A more appropriate significance criterion for this project would be one that evaluates the extent to which sustained yield management is impacted. Gravel extraction and the CHERT adaptive management program is based on the assumption that ecological impacts due to extraction are avoided and minimized when: 1) sustained yield management limits extraction volume, and 2) extraction techniques and locations are properly designed and implemented. In comments on the January 2009 Draft SPEIR and in subsequent meetings, CDFW stated that they do not agree with this assumption, but they do state support for the CHERT adaptive management process (CDFG 2009a).

Therefore, based on the assumption that sustained yield extraction and carefully designed extraction designs will avoid and minimize geologic impacts, yet recognizing that scientific consensus has not been reached, we propose that a potentially significant impact on geomorphic resources occurs if the project inhibits, minimizes, or prevents sustained yield management or implementation of properly designed extraction techniques and locations.

To evaluate impacts, baseline conditions must also be defined. Because the CHERT adaptive management program began in 1992, baseline conditions are defined as geomorphic conditions existing in the late 1980s and early 1990s. These conditions were characterized by:

- Channel degradation to the point where in-channel structures were affected. Bed elevation had decreased to the point where bridge piers and the water supply intakes were exposed and undermined. Bed elevation lowering, from the Blue Lake Bridge to Highway 101 (1960 to 1992), was an average 0.15 ft/year, or approximately 5 feet from 1960 to 1992 (Lehre 1993)
- Gravel extraction volumes in excess of mean annual recruitment (Figure 2-6)
- Extraction methods that sometimes impeded fish migration, and increased riparian habitat loss (HCPBD 1994)

## 3.4 Water Quality Environment

As stated in the introductions to this document and to this Environmental Setting section, this Draft SPEIR is limited to presenting "information necessary to make the previous EIR adequate for the project" (Title 14 CCR Chapter 3, Article 9, Sections 15122 through 15131). Specific to water quality, new information since the 1994 PEIR includes the finalization of the Mad River's Total Maximum Daily Load (TMDL) for: 1) sediment and turbidity (USEPA 2007a), and 2) temperature (USEPA and SWRCB 2006). Therefore, the following subsections include information needed to understand gravel extraction and the CHERT adaptive management program's potential impacts on water quality, in the context of the newly finalized and proposed TMDLs.

The water quality effects of sand and gravel operations on the lower Mad River are covered under General Waste Discharge Requirements (WDR No. R1-2005-0011), which includes Certification under Clean Water Act Section 401, as summarized in Table 3-25.

**Table 3-25. Waste Discharge Requirements and 401 Certification for gravel operations on the lower Mad River**

| Extraction Operators | Extraction Sites, Downstream to Upstream | Covered under General WDR No. R1-2005-0011 (includes "401 Certification") |
|---|---|---|
| Eureka Ready Mix | O'Neill Bar | Yes, WDRs indicate processing at Glendale and Boyd |
| GR Sundberg | Miller Bar | Unknown |
| Eureka Ready Mix | Johnson-Spini Bar | Yes |
| Mercer Fraser | Essex Bar | Yes |
| Granite Construction Company | Johnson Bar | Yes, but asphalt plant scrubber discharges not covered |
| Eureka Ready Mix | Christie Bar | Yes |
| Granite Construction Company | Blue Lake Bar | Yes |
| Granite Construction Company | Emmerson Bar | Yes |
| Mad River Sand and Gravel | Guynup Bar | Yes, but asphalt plant scrubber discharges not covered |

In 1992, the USEPA listed the Mad River as an impaired water body in terms of sediment and turbidity (USEPA 2007a). The North Coast RWQCB continued to list the Mad River as impaired for sediment and

turbidity, and in 2006, it added impairment for temperature. In December 2007, the USEPA published the final TMDL for sediment and turbidity; the temperature TMDL will be evaluated and published by the North Coast RWQCB but will not be available until 2019 (USEPA and SWRCB 2006).

### 3.4.1 Sediment and Turbidity

The Mad River's TMDL assessment classifies the Mad River watershed into four hydrogeologic subareas; the subarea of interest to gravel extraction is the Lower Mad River subarea, which includes the North Fork of the Mad and its tributaries, Powers Creek, and Lindsay Creek (USEPA 2007a). Land uses that contribute sediment and turbidity in the Lower Mad River subarea are grazing and other agricultural uses, timber harvest, recreation, residential, transportation that includes highway bridges, municipal water supply, and gravel mining.

The TMDL report identifies "gravel mining" as a land use, and states that the NMFS and the USFWS identify gravel mining as a potential threat to recovery of endangered species. The concept of sustained yield management is also discussed; however, whether the TMDL preparers recognize a difference between gravel mining (removal of gravel in excess of sustained yield) and gravel extraction (removal of gravel limited by sustained yield and other constraints) is unclear.

How to measure sediment and turbidity, and which metrics to use in assessing a TMDL, was one of the first analyses in the TMDL report. The preparers found that "turbidity in the Mad River is adequately represented by suspended sediment loads; thus, suspended sediment loads are used to express the turbidity TMDLs" (USEPA 2007a). EPA used the numeric objective that sediment load should "not be increased more than 20% over natural background conditions," as the basis for setting the TMDLs. Efforts were then focused on defining natural background conditions.

In the sediment source analysis for the Mad River watershed, EPA concluded that current sediment loading for the whole basin (based on average 1976–2006 rates) is almost 300% of natural loading; loading in the Middle Mad is almost 500% of natural loading. This is in excess of the TMDLs, which are set at 120% of the natural sediment load (averaged over time to account for large storms). Sediment delivery and erosion from human disturbance is from landslides and surface erosion caused by or related to roads, and, to a much lesser extent, timber harvesting. For the watershed as a whole, 64% of the total sediment load is associated with anthropogenic, management related activity.

Total sediment load was estimated as bedload and suspended sediment, with bedload being much less than suspended sediment. In the Lower/North Fork subarea, suspended load is 95% of the total load. Sediment sources were identified and quantified for the whole basin and for the subareas. For the Lower/North Fork subarea, natural background suspended sediment is estimated to be 22% of total suspended sediment; human-caused or management related sediment is estimated to be 78%, as summarized in Table 3-26 (USEPA 2007a).

**Table 3-26. Suspended sediment loading of the Lower/North Fork subarea, from 1976 to 2006 (adapted from USEPA 2007a)**

| Suspended Sediment Source | Percentage of Total | Subtotal Sediment Source | Percentage of Total | Total Sediment Source | Percentage of Total |
|---|---|---|---|---|---|
| Natural landslides | 0 | NA | | Total natural | 22 |

| Suspended Sediment Source | Percentage of Total | Subtotal Sediment Source | Percentage of Total | Total Sediment Source | Percentage of Total |
|---|---|---|---|---|---|
| Creep | 20 | | | | |
| Bank erosion | 2 | | | | |
| Road-related landslides | 36 | Subtotal road related | 73 | Total management related | 78 |
| Surface/other road sources | 37 | | | | |
| Harvest-related landslides | 5 | Subtotal harvest related | 5 | | |
| Harvest erosion | 0 | | | | |

For the entire Mad River basin, landslides are the dominant natural sediment-producing sources, and roads are the dominant management related sources; road-related landslides and surface erosion contribute 62% of the sediment in the basin as a whole. In the Lower/North Fork subarea, 73% of the suspended sediment is road related, which is consistent with the highest road densities in the Mad River basin being found in the Lower/North Fork subarea (USEPA 2007a). Suspended sediment associated with gravel extraction would be included in "Total management related" sources, but gravel extraction was not considered a source in the modeling assessments that are the bases of the TMDLs.

CHERT recommendations and agency permits specify that skimming be performed at or above the bar elevation that corresponds to the 35% exceedence flow. One reason the 35% exceedence flow elevation was selected is that the river's suspended sediment is very high by the time water begins to flow over the bar surface. CHERT scientists have observed that at that flow, infiltration of precipitation moves fines from the surface to subsurface. By extending the time it takes the river to begin flowing over the extracted bar surface, there is more opportunity for precipitation to wash fines downward into the gravel profile, rather than washing them into the low-flow stream while water is still clear.

The CHERT program has also resulted in new requirements for temporary bridge crossings, which likely have reduced suspended sediment input into the stream during the installation, use, and removal of summer bridge crossings.

### 3.4.2 Temperature

The 2006 version of California's list of impaired watersheds also includes temperature on the Mad River. Comments under the Mad River basin's listing are (USEPA and SWRCB 2006):

> "Recent (1997-2000) temperature data collected on the mainstem of the Mad River indicate that high temperature levels may be a source of impairment of cold water fisheries in the river. Data were available from 11 locations, with at least 2 years of record at most locations. [Maximum Weekly Average Temperature] MWAT values at all of the 11 locations exceeded 20°C [68°F], and are higher than any available temperature criteria for sub-lethal effects (reduced growth) on juvenile salmonids. Records also indicate that maximum temperatures at most of the 11 locations in most years are higher than 24°C [75.2°F]."

The MWAT is the maximum weekly average temperature. This term is frequently used in the literature, but it is imprecise and used inconsistently (USEPA 2007b). The more exact metric, the "max7daat", is the maximum 7-day running average of all recorded temperatures. In the TMDL for sediment and temperature on the Eel River, the USEPA based its temperature TMDL on the max7daat, instead of the MWAT. The Eel River TMDL report was published on December 18, 2007, whereas the Mad River temperature TMDL report is not due until 2019. The assessment of the temperature TMDL will be carried out by the North Coast RWQCB, unlike the Eel River TMDL, which was prepared by the USEPA (USEPA 2006).

The North Coast RWQCB was unable to provide information on the temperature data collected during 1997 to 2000. Whether the locations of the temperature data points were in the lower Mad River is unknown. The Humboldt Bay Municipal Water District reported limited temperature data in its Habitat Conservation Plan; the data were collected during salmonid surveys conducted between Highway 299 and the Annie and Mary Bridge railroad trestle during September and November 1994. Their data ranged from 60 to 67° F (15.5 to 19.4° C) (HBMWD 2004). Data are available from 3 US Geological Survey stations on the lower Mad River (at Korbel, Blue Lake, and Arcata), but temperature data were collected only during the early and mid-1970s. The Klamath Resource Information System (KRIS) was consulted online; the Mad River was mentioned in documents but temperature charts or data could not be found. Temperature data may have been collected by the operators, as requested by COE, but the location(s) of those data (if they were collected) is unknown.

The KRIS website did provide a summary of factors that affect river water temperature (KRIS Undated), based on many studies available in the literature. Based on a stream temperature model, SNTEMP, factors affecting stream temperature, from greatest to least effect, are (Bartholow 1989):

- Air temperature
- Relative humidity
- Percent shade
- Streamflow
- Inflow temperature
- Stream width

Recent studies have found other factors to be important in determining stream temperature, including direct shade from riparian trees or buffer width, stream sedimentation, and proximity to coast and cooler air temperatures (KRIS Undated).

In setting temperature TMDLs on the Lower Eel River, USEPA concluded that changes in flow and shade do not adversely affect the beneficial uses of the Lower Eel mainstem, basing some of their conclusion on the SHADE model (USEPA 2007b). Therefore, a temperature TMDL was deemed unnecessary on the Lower Eel mainstem, but necessary on the tributaries. Because shade and flow conditions on the Lower Eel and Lower Mad rivers are similar but not identical, whether a temperature TMDL on the Lower Mad River mainstem will be assessed is currently unknown.

Whether or not gravel extraction affects stream temperature has not been determined for the lower Mad River. If extraction removed riparian vegetation, then air temperature, relative humidity, and percent shade would be affected, depending on the density and acreage of riparian vegetation removed. The location of the vegetation relative to the low flow channel position is also important. Gravel extraction does not determine or affect flow magnitude and timing; the opposite (flow magnitude and timing dictate gravel extraction) is a

closer representation of what actually occurs. On the lower Mad River, flow is dependent on natural processes and on the activities of the Humboldt Bay Municipal Water District (HBMWD).

When the minimum skim floor elevation is the 35% exceedence flow elevation, gravel extraction does not increase the surface area of the low flow channel. Thus, in this respect extraction cannot lead to an increase in stream temperature. By the time the flow rises to the 35% exceedence elevation, the solar angle is much lower and the impact of incoming solar radiation is greatly reduced throughout the watershed. Stream flow temperature is greatly reduced at this time and minor temperature increases can be easily tolerated.

The HBMWD continues to augment flow in the Lower Mad River during the summer months. To provide water to both existing residential users and prospective industrial users, the HBMWD stores water in Ruth Reservoir, located in the upper part of the Mad River watershed. During summer months, water is released from the reservoir for hydropower purposes and to meet low flow requirements below Essex. The HBMWD reports that prior to development of their system, portions of the Lower Mad would "go dry" (HBMWD 2004). The required low flows maintain the lower channel flows at levels greater than under "natural" conditions (HBMWD 2004).

### 3.4.3 Comments on Water Quality

The North Coast RWQCB commented on the NOP that was prepared for the 2009 Draft SPEIR, as summarized in Table 3-27.

**Table 3-27. Comments on water quality and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| 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. | Peer review has been conducted by resource agencies commenting on extraction plans, CHERT 5-year reports, and the 2009 Draft SPEIR. Given lack of consensus, peer review by the larger scientific community would likely be informative. Funding sources for peer review have not been identified. | Possibly, but funding sources are unknown | RWQCB comment letter November 21, 2007 |

### 3.4.4 Summary of Present and Possible Future Conditions

The present and possible future water quality conditions are summarized in Table 3-28.

**Table 3-28. Summary of water quality present and possible future conditions**

| Water Quality Criterion | Present Conditions | Future Conditions |
|---|---|---|
| Suspended sediment and turbidity | Suspended sediment concentrations, as measured by turbidity, are high in the Mad River as a whole, based on the need for TMDL assessment. However, gravel extraction in the Lower Mad River does not add measurably to the total load, as determined by EPA water quality models. | If TMDL goals are met, suspended sediment and turbidity should decrease. |

| Water Quality Criterion | Present Conditions | Future Conditions |
|---|---|---|
| Temperature | Temperature measurements on the Mad River (exact locations unknown) indicate that a temperature TMDL should be set, however, it need not be ready until 2019. Limited data are available to represent the Lower Mad River. | Changes in temperature conditions are not expected until TMDL goals are set and implemented. |

### 3.4.5 Definitions of Significance and Baseline Conditions

Definitions of significant impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. In the CEQA checklist section evaluating water quality, the guidance that most applies to suspended sediment and water quality is "Would the project... violate any water quality standards or waste discharge requirements?" The gravel operations on the Lower Mad River are covered under General Waste Discharge Requirements, so the proposed definition of potentially significant is an impact caused by or due to nonconformance with the General Waste Discharge Requirements. Based on the General Waste Discharge Requirements and its combined Section 401 Certification, the current activities that are recommended by CHERT do not cause suspended sediment increases that are measurable and attributable, because current regulations do not allow the discharge of soil or sediment into waters of the State. The RWQCB did not include gravel extraction as a source in their model for determining suspended sediment. Therefore, a suspended sediment baseline is not proposed, but suspended sediment impacts will be considered significant if suspended sediment causes nonconformance with the General Waste Discharge Requirements and Section 401 Certification.

The water quality objectives of the "Water Quality Control Plan for the North Coast Region" (NCRWQCB 2007) are likely sources for defining significant temperature impacts. The narrative water quality objective is "the natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such an alteration in temperature does not adversely affect beneficial uses." The quantitative water quality objective for cold water habitats is "at no time or place shall the temperature of any COLD (water with a beneficial use of cold freshwater habitat) water be increased by more than 5°F [15°C] above natural receiving water temperature."

Therefore, for this Draft Supplemental PEIR, a potentially significant temperature impact is 1) an impact that is due to gravel extraction and the CHERT adaptive management program's activities or recommendations, and 2) an impact that does not fulfill the narrative or quantitative water quality objective for temperature.

Because a significant impact is determined by adherence to the narrative or quantitative water quality objectives for temperature, these objectives are the baseline for temperature impacts.

## 3.5 Utilities and Public Services Environment

Public utilities and structures potentially affected by the Proposed Project were described in the 1994 PEIR. The public utilities and structures of concern in the 1994 PEIR were in-channel structures affected by channel bed degradation, which was manifested by scoured or exposed bridge supports or piers.

The conditions of in-channel structures as noted in the 1994 PEIR, as well as their recent conditions, are described in Table 3-29. CHERT members performed a field survey to verify current conditions of the in-

channel structures in May 2013. Maps and surveys for many, if not all, of the structures are available at Caltrans offices. The gravel extraction operations were added to the table so that recent descriptions of the areas in the vicinity of the structures could be available for comparison.

**Table 3-29. In-channel structures and extraction operations in 1994 (HCPBD 1994) and 2013.**

| In-Channel Structure or Gravel Extraction Operations, River Mile (RM)[a] | Condition Description in 1994 | Recent (2013) Description |
|---|---|---|
| Mad River Fish Hatchery weir, and rock slope protection, RM 11 | The weir acts as a vertical control point in the river's longitudinal profile. The toe of this rock slope protection was keyed into a trench on the river's left bank, adjacent to the hatchery. Elevations or plans for its construction were not available. | The weir is no longer used. State agencies would like to remove the weir and its rock slope protection. |
| Mad River Sand and Gravel, Guynup bar, RM 10.4 | General decrease in elevation from 1994 to 2003, indicates overall degradation. | |
| Granite, Emmerson bar, RM 9.7 | General decrease in elevation from 1993 to 2003 (see Figure 10 in Lehre et al. 2005) indicates overall degradation. | |
| Hatchery Road rip rap RM 9.7 | N/A | Location is dynamic, recent bank erosion at gaps in riprap that are unrelated to gravel extraction. |
| Hatchery Road Bridge (called Blue Lake bridge in 1994 PEIR), and Blue Lake right bank levee, RM 9.4 | Comparison of 1982 and 1991 channel cross-sections surveyed showed maximum local bed lowering of 4.5 ft. Mean bed lowering (lowering averaged across the entire channel width) was1.6 ft. The toe of this levee was keyed into a trench on the river's right bank; trench bottom elevations at time of construction are unknown. | Presently appears secure. |
| Granite, Blue Lake bar, RM 9.0 | General decrease in mean cross section elevations from 1993, 1997, and 2003 (see Figure 10 in Lehre et al. 2005), indicates degradation. | |
| Blue Lake sewage ponds and levee, RM 8.7 | The 1,700 ft. long levee was repaired in 1971 and again in 1994. | Likely stable |
| ERM, Christie bar, RM 7.5 | General decrease in mean cross section elevations from 1993 to 2003 (see Figure 10 in Lehre et al. 2005), indicates degradation. | |
| Power's Creek | Concrete in bed near bridge west of Blue Lake Bar prevented bed degradation in Power's Creek, resulting in 6 foot vertical jump in Power's Creek bed profile. | Appears stable but remains a fish migration barrier. |
| Granite, Johnson bar, RM 7.0 | Little elevational change from 1993 to 2003 (see Figure 10 in Lehre et al. 2005), but other measurements indicate general channel aggradation. | |
| Highway 299 Mill Cr bridge, RM 7.0 | Near its entrance to the Mad River, Mill Creek had cut down 8 to 10 ft. since its bridge was constructed. Large rocks had been placed below the Hwy 299 Mill Creek crossing to prevent undercutting and to allow fish passage. | The site has a new (2012) concrete fish ladder structure that both stabilizes the channel bed elevations and ensures fish passability. |

| In-Channel Structure or Gravel Extraction Operations, River Mile (RM)[a] | Condition Description in 1994 | Recent (2013) Description |
|---|---|---|
| North Coast RR Authority bridge and water line, RM 6.2 | The footings of the northern pier of the railway bridge were "virtually completely exposed and appear to be undermined" (HCPBD 1994). A stick thrust 4 -5 feet under the pier's NE corner did not encounter solid structure. A willow growing on the south side of this pier marked a position of the old ground surface; the willow's base was about 8 feet above the current bed surface. | Aggradation is currently minimizing impacts already experienced during past periods of channel degradation |
| Glendale Drive bridge over Lindsay Cr, RM 6.1 | About 10 ft. of channel bed erosion has occurred in the period from 1926 (construction) to 1994. | Bridge was recently re-built and channel appears passable to fish. |
| Highway 299 bridge over Lindsay Cr, RM 6.1 | Near its entrances to the Mad River, Lindsay Creek had cut down 8 to 10 ft. since its bridge was constructed. The eastern footings of the Lindsay Creek bridge were completely exposed. | Channel appears passable to fish. Aggradation should minimize elevational differences between Lindsay Creek and the Mad River.. |
| Railroad trestle over Warren Cr, RM 5.3 | Scour beneath the trestle of 2 to 3 ft. One pier footing exposed. | Recently reconstructed bridge supports should be designed to tolerate channel elevation changes in a dynamic river system |
| Warren Cr Road bridge, RM 5.3 | Built in 1927, no scour problems noted in 1979. | Recent (2007) bridge replacement. Bridge appears stable and channel appears passable to fish. |
| Mercer Fraser Essex bar, RM 5.3 | Elevations in 1997 to 2003 were higher than in 1993 to 1997, indicating general channel aggradation (see Figure 10 Lehre et al. 2005). | |
| Structures of the HBMWD, between RM 4.6 and 5.9 | The HBMWD's Ranney collector towers were increasingly exposed; one tower's modifications indicated up to 8 ft. of bed lowering. Bed lowering at pump station 6 brought the pumps to within 0.5 - 1 ft. of "sucking air" at low water. In 1994, cross sections indicated mean bed lowering throughout the reach was about 4 - 5 ft. since 1960. | Aggradation should reduce scour around the Ranney collectors and at the direct intake.. |
| Upper and lower HBMWD water pipe crossing, RM 4.9 and RM 4.0 | At the upper crossing, trench bottom elevation at construction (1960) was -6 ft. MSL, and thalweg elevation was 24 ft. In 1992, thalweg elevation was 20 ft. At the lower crossing, the trench bottom elevation in 1960 was 1 ft, and thalweg elevation was 18 ft. Thalweg elevation in 1992 was 12 ft. | |
| Highway 299 bridges, RM 4.0 | Comparison of 1960 and July 1991 channel cross sections showed maximum local bed lowering of greater than 10 ft. under the downstream (westbound) span of the Hwy 299 bridge. The footings of pier 4 were exposed and the concreted right bank at pier 5 was undercut. | The Hwy 299 bridge was retrofit by deepening piers, increasing its seismic stability. Over the same period, the bed elevation has |

| In-Channel Structure or Gravel Extraction Operations, River Mile (RM)[a] | Condition Description in 1994 | Recent (2013) Description |
|---|---|---|
| PG&E upper gas line via the Highway 299 bridge, RM 4.0 | Bank erosion and gravel extraction had "occasionally" exposed the pipe on the north side of the bridge. Pipe exposure risk decreased due to rock slope protection installed. | increased due to CHERT constraints on mining volumes. |
| ERM Johnson-Spini bar, RM 3.9 | In 1993 to 1997, average elevation was higher than elevations measured in 1997 to 2003 (see Figure 10 Lehre et al. 2005), but general channel aggradation is still indicated. | |
| GR Sundberg, Inc. Miller-Almquist bar, RM 3.6 | Mean elevation increase from 1994 to 2003, indicates general channel aggradation. | |
| McKinleyville Community Services District water pipe crossing, RM 3.4 | At construction, the elevation of the trench bottom was -10 ft, and the thalweg was at 8 ft. | Conditions are assumed to be improving because structures are located between extraction site cross sections that have aggraded in recent years. |
| ERM O'Neill bar, RM 3.3 | Elevations in 1997 to 2003 were higher than those in 1993 to 1997, indicating general channel aggradation. | |
| Highway 101 bridge, RM 1.8 | Caltrans surveys of the Highway 101 bridge show maximum downcutting of 17 ft. since 1929 on the upstream span, and 8 ft. since 1957 on the downstream span. | New construction brings bridge supports up to current design standards |
| Hammond Trail bridge RM 0 | The bridge marks the end of the project area of the 1994 PEIR. Recent surveys indicate the aggradation process found upstream also extends to this reach. | |

[a] River mile locations were updated to be consistent with CHERT cross section analyses.

### 3.5.1 Comments on Public Services

The California Department of Transportation commented on the 2009 Draft PEIR (Table 3-30).

**Table 3-30. Comments on public services and whether consensus has been reached**

| Comment | Discussion/Response | Scientist Consensus Reached? | Sources |
|---|---|---|---|
| "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...our main concern ...is the long-term degradation of the river." | Sustained yield extraction is associated with aggradation of the downstream sites where Highway 299 and 101 bridges are located | Yes | March 2009 comment letter on 2009 Draft PEIR |

### 3.5.2 Summary of Present and Possible Future Conditions

Many of the past problem conditions described in the 1994 PEIR have been addressed by either renovation or maintenance of the in-stream structures, or by changing river conditions (aggradation). Because CHERT's extraction policy is to limit extraction up to the mean annual recruitment volume, channel degradation

problems of the past have improved and will likely be avoided in the future. From field observations, it is clear that conditions have improved markedly since 1994 at several infrastructure facilities. For example, the A&MRR bridge pier is now well supported by gravel, unlike its 1993 condition that showed serious undermining. The US Highway 299 bridge has been retrofit to reduce scour vulnerability, and recent observations indicate that the channel bed has aggraded through the bridge reach.

### 3.5.3 Definitions of Significance and Baseline Conditions

Definitions of significant impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. In the CEQA checklist section evaluating public services and transportation, roads are evaluated, but primarily in the context of whether the level of service will be affected. Bridges are not specifically evaluated, but could be considered "governmental facilities", and could be considered covered under the question, "would the project... result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities?"

At the time the 1994 PEIR was written, in-channel structures such as bridge supports and HBMWD Ranney wells were in need of repair and renovation, due to bed degradation. Gravel extraction in excess of MAR was thought to be a major factor, but other factors included historical events such as the 1955 and 1964 floods, which created large aggradation episodes. The CHERT program has no control over the occurrence of high flow events, but can manage the volume and techniques of extraction.

Therefore, a significant effect of the Proposed Project on in-channel structures is defined as an adverse condition that results from gravel extraction that exceeds the MAR established by the Corps and NMFS in 2004. If extraction adheres to the sustained yield policy, then bed degradation that affects in-channel structures is likely not associated with gravel extraction because it would be more likely to be associated with in-channel structures that were designed and constructed during periods of high aggradation, such that subsequent scour requires repairs and renovation.

To evaluate impacts, baseline conditions must also be defined. Because a significant effect is a condition resulting from extraction in excess of the MAR, the baseline for this effect is the MAR itself (175,000 $yd^3$/year).

## 3.6 Cultural Factors

We evaluated whether a new cultural factors impact analysis was needed, or whether the 1994 PEIR would be a sufficient resource. The evaluation is best conveyed in a table format, as presented in Table 3-31.

**Table 3-31. Evaluation of need for new cultural factors impact analysis**

| Conditions under which a Subsequent Cultural Factors Evaluation should be Prepared (CEQA guidelines Section 15162(a)) | Condition of Existing Cultural Resources Evaluation in the 1994 PEIR for Gravel Extraction on the Lower Mad River |
|---|---|
| "(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR ... due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects." | No changes are proposed in the CHERT adaptive management program that would involve new significant effects, or a substantial increase in severity of already identified cultural factors effects |

| Conditions under which a Subsequent Cultural Factors Evaluation should be Prepared (CEQA guidelines Section 15162(a)) | Condition of Existing Cultural Resources Evaluation in the 1994 PEIR for Gravel Extraction on the Lower Mad River |
|---|---|
| "(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR ... due to ... new significant environmental effects or a substantial increase in the severity of previously identified significant effects." | No circumstances under which the CHERT adaptive management program is undertaken will create significant environmental effects or a substantial increase in severity of already identified cultural factors effects |
| "(3) New information of substantial importance, which was not known and could not have been known ... at the time the previous EIR was certified ...shows any of the following:<br>(A) The project will have one or more significant effects not discussed in the previous EIR;<br>(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;<br>(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, ... or<br>(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects ... but the project proponents decline to adopt the mitigation measure or alternative." | (A) With respect to cultural factors, continuing the CHERT adaptive management program will not have one or more significant effects<br>(B) A potential significant effect on cultural factors was examined in the 1994 PEIR (Impact Arch-1, p. 185) and the effects previously examined will be substantially the same as shown in the previous EIR. Mitigation measures Mit-17 and Mit-18 were developed to address potential impacts<br>(C) and (D) Mitigation measures Mit-17 and Mit-18 of the adopted 1994 PEIR were considered adequate to address and reduce the potential impacts to cultural factors. No new or different mitigation measures were found necessary |

## 3.7 Climate Change and Greenhouse Gas Emissions

In 2006, the California Legislature passed the California Global Warming Solutions Act (AB 32). This legislation defines greenhouse gases (GHG), requires CARB to adopt regulations such that greenhouse gases are reduced to 1990 levels by the year 2020, and requires the CARB to publish "early action GHG emission reduction measures" by June 2007. CARB staff identified 44 early action measures (CARB 2007). Early action measures that are applicable to gravel extraction on the Mad River are (CARB 2007):

- Measure #22. Anti-idling enforcement. The strategy guarantees emission reductions as claimed by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling.
- Measure #24. Tire inflation program. The strategy involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. Specifically, the strategy seeks to ensure that tire pressure in older vehicles is monitored by requiring that tires be checked and inflated at regular service intervals.
- Measure #29. Diesel – off road equipment. On July 27, 2007, ARB adopted an in-use diesel off road equipment regulation that requires diesel equipment fleet owners to reduce their fleet-average emissions of NOx and PM in future years by turnover of a specified percentage of their fleet horsepower.

In January 2012, the Humboldt County Department of Community Development Services (to be renamed the Planning and Building Department) prepared a draft "Climate Action Plan" that is Appendix U of the Draft EIR for the General Plan Update (HCDCDS 2012b). This document provides a recent and thorough

analysis of the County's progress in regulating greenhouse gas emissions. Directly quoting from this source (HCDCDS 2012b):

> "At the present time, there are no rules or regulations in place from the ARB [Air Resources Board], State Clearinghouse, or other resource agency applicable to the Proposed Project that define what is a "significant" source of greenhouse gas (GHG) emissions, and there are no applicable facility-specific GHG emission limits or caps. The NCAQMD has not yet established thresholds for greenhouse gas emissions. And, as of the time of this writing, no other air districts within California have established emission thresholds for determining the significance of GHGs from industrial projects. Also, while the goal of AB 32 is to reduce instate GHG emissions to 1990 levels by the year 2020, there is no clear metric that would determine if a single project advances toward or away from this goal."

The County developed an inventory for unincorporated Humboldt County that included a 1990 baseline for GHG emissions, and a 2006 baseline that coincided with the County's draft General Plan Notice of Preparation. In 2006, "the overall GHG emissions in unincorporated Humboldt County in terms of carbon dioxide equivalents (eCO2) is approximately a half million metric tons less than in 1990" (HCDCDS 2012b). The authors attributed the decrease to declines in the timber/lumber industry and closure of major facilities associated with timber processing, such as pulp mills.

### 3.7.1 Summary of Present and Possible Future Conditions

An estimate of the operators' GHG emissions was calculated using an online CO2 emissions converter (carbonneutral.com[8]). The online calculator converts the volume and type of fuel used into tons of CO2 equivalent (CO2e). Three operators provided their approximate usage of diesel fuel for gravel extraction in a season (250, 500, and 72,000 gallons of diesel per year, see Section 2.1.5). Use of 72,000 gallons of diesel results in GHG emissions of approximately 640 tons CO2e per year; 54,565 $yd^3$ of gravel were extracted. Using a simple ratio of CO2e emitted and volume of gravel extracted results in 0.012 tons CO2e per $yd^3$ of gravel. In 2012, gravel extracted on the Mad River (not including that extracted by the Blue Lake Rancheria) was 100,329 $yd^3$ potentially emitting 1204 tons CO2e.

Possible future conditions of GHG emissions are likely to be less than current conditions because, as summarized in Table 3-32:

- Early action measures will be implemented
- The volume of gravel extracted has been decreasing, due to market demands and regulatory pressures. The gravel extracted is proportional to the volume of diesel used, so the less gravel extracted, the less GHG emitted. In 1990, the volume extracted on the Mad River was 348,403 $yd^3$, which is three times more than is currently extracted.

**Table 3-32. GHG emissions present and future conditions**

| Greenhouse Gases Emissions | Present Conditions | Future Conditions |
|---|---|---|

[8] The URL for this CO2 emissions converter is http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

| Greenhouse Gases Emissions | Present Conditions | Future Conditions |
|---|---|---|
| GHG emissions affected by early action measures | Early action measures to reduce GHG emissions have been adopted and published. Operators are presently complying with recent regulations. | At gravel operation sites, GHG emissions should decrease once early action measures are implemented. |
| GHG emissions due to diesel fuel combusted | Based on highly variable estimates of fuel used, but using the most conservative estimate, 1,240 tons CO2e were emitted in 2012. | GHG emissions are likely to decrease because emissions are proportional to fuel used, and less gravel extraction requires less fuel used. |

### 3.7.2 Definition of Significance and Baseline Conditions

The California Air Resources Board has published greenhouse gas (GHG) emissions goals (CARB undated). The goals are to:

- Reduce GHG emissions to 1990 levels by 2020, a reduction of approximately 30 percent, and
- Reduce GHG emission to 80% below 1990 levels by 2050.

The County's estimates for CO2e emissions and CO2e emissions goals are in Table 3-33.

**Table 3-33. County's estimated CO2e emissions and emissions goals**

| | 1990, estimated in County's CAP[a] | 2003, estimated in County's CAP | 2006, estimated in County's CAP | County's 2020 goal of 10% below 2003 levels | EO S-3-05 2050 goal of 80% below 1990 levels |
|---|---|---|---|---|---|
| Total CO2e (million ton/yr) in County | 1.82 | 1.22 | 1.31 | 1.10 | 1.456 |
| Industrial CO2e emissions (million ton/yr) in County | 0.82 (817,364 tons/yr) | 0.24 (236,365 tons/yr) | 0.27 (272,233 tons/yr) | Goals are not specified by emission source or type. | |

[a] Climate Action Plan

A GHG inventory was developed for unincorporated Humboldt County, including an AB32 GHG emissions 1990 baseline, and using 2006 data (HCDCDS 2012b). In terms of overall GHG emissions, the County has experienced a significant decline in industrial emissions since 1990. This is likely attributed to a steady and significant decline in the lumber industry and closure of major industrial facilities related to timber processing, such as numerous lumber mills and several pulp mills. Based on the most current available data, the overall GHG emissions in unincorporated Humboldt County is approximately a half million (500,000) metric tons CO2e less than in 1990. Industrial emissions were tabulated based on NCUAQMD permit data. In 1990, industrial emissions were estimated at 817,364 tons CO2e and in 2006, emissions were estimated at 272,233 tons CO2e. Surface mining operations have relatively minor air emissions compared to major industrial facilities such as pulp mills and saw mills.

CO2e emissions due to gravel extraction covered in this SPEIR are considered significant if the sources' emissions result in the County exceeding its 2020 goal of CO2e emissions of 10% below 2003 levels, or 1.10 million tons/yr.

# 4 POTENTIAL IMPACTS AND MITIGATION MEASURES OF THE PROPOSED PROJECT

As described in the introduction to this Draft SPEIR, this document describes and analyzes how and whether the Proposed Project has mitigated: 1) impacts described in the 1994 PEIR, and 2) impacts that were not recognized in 1994, but that are recognized now. These two categories will be analyzed for impacts due to the Proposed Project, which is continued instream gravel extraction and CHERT adaptive management.

For instream gravel extraction on the Mad River, scientists have not completely agreed on the degree of impacts and the success of mitigation measures. One of the 1994 PEIR's mitigation measures is the CHERT adaptive management program, and scientists do not completely agree on some points upon which the adaptive management program rests. The points in question include:

- Extraction using sustained yield volumes and properly designed extraction techniques can result in less than significant impacts.
- Mean annual recruitment, which is estimated based on observations over decades, should be replaced with annual estimates such as NMFS' Fractional Extraction Volume.
- Channel width increases in the upper sites are primarily due to high flows and geomorphic setting (that is, bank material resistance to erosion, deposited during floods of the 1960s), and less due to gravel extraction.

Regardless of the uncertainty in these points, the public and decision-makers must still determine whether the Proposed Project or its alternatives should go forward. Moving forward is possible by considering the following:

- Are data specific to the Mad River available to resolve the issue?
- Is the issue supported by analyses indicating causality or correlation?
- How much uncertainty is there in the scientists' conclusions?
- Have conclusions been peer reviewed or supported in the literature?

By considering the above questions, we can still make informed and balanced decisions on the effects of gravel extraction on the lower Mad River. In this impacts evaluation section, we summarize points of uncertainty, apply the above questions, and then make impact determinations. If impacts are determined to be significant or potentially significant, mitigation measures are described.

## 4.1 Air Quality

### 4.1.1 Summary and Evaluation of Uncertain Issues

No air quality issues are subject to disagreement among CHERT and resource agency scientists.

### 4.1.2 Impacts Evaluation

Using the significance definitions proposed in Section 3.1.4, a potentially significant impact on air quality occurs if the project:

- Violates any ambient air quality standard,
- Contributes "substantially" to an existing or project air quality violation,
- Exposes sensitive receptors to "substantial" pollutant concentrations, or
- Results in inconsistency with air quality plans designed to bring an area into "attainment."

Air-suspended particulates (dust) and vehicle exhaust from gravel extraction can potentially affect air quality. Dust can be generated by vehicle movement, handling of gravel from stockpile to stockpile, and by certain extraction methods such as skimming and wetland pit extraction.

Because the operators all operate under NCUAQMD Permits to Operate, violations or exceedances of the rules above would result in permit violation, and they are very rare.

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.

The Air District evaluates applications for a Permit to Operate to determine whether the developer-applicant constructed the facility according to the conditions of the Authority to Construct. The Air District also determines whether the developer-applicant will comply with the district's rules and regulations when operating the facility. The air district will also determine compliance with applicable federal regulations in the case of facilities with Title V requirements. A compliance source test may be required. If required, the test must be conducted by the district or by an approved independent source testing consultant. The Air District is responsible for ensuring that the emission sources continue to operate according to the district's rules and regulations.
Permits to operate are subject to the following regulations:
*Rules and Regulations / Permit Applications*, Published by NCUAQMD
*Clean Air Act* (42 U.S.C. 1857 et seq.)
*California Health and Safety Code*, sections 39000-43834; and
*California Air Pollution Control Laws*, Published Annually by the Air Resources Board.

These publications are available at the NCUAQMD, and at the Air Resources Board, P.O. Box 2815, Sacramento, California 95812. A more detailed discussion of the permit requirements and an explanation of how they correspond to significance standards is contained in Appendix E.

Air quality impacts from the Proposed Project are considered less than significant because none of the impacts could cause a violation; therefore, no mitigation is required. Two potential impacts were added since the 1994 PEIR; they are designated Air-3 and Air-4, and result from concerns raised in the September 2007 Notice of Preparation. Air-3 has been elevated such that it is addressed in a separate section (Section 4.9.1). The potential air quality impacts associated with the Proposed Project and the level of significance thereof are summarized in Table 4-1.Table 4-1. Air quality impacts from the Proposed Project are determined to be less than significant.

| Impact Designation, Source | Air Quality Impact | Impact Determination | Mitigation Required, If Any |
|---|---|---|---|
| Air-1 and Air-2, 1994 PEIR | Gravel extraction and diesel combustion could increase PM10 concentrations | Less than significant. If a Permit to Operate is granted, generation of PM10 is considered less than significant; also increases in the rate of PM10 generation are not anticipated in the future. Implementing 2008 diesel regulations (see Section 3.1, and Appendix E) will allow operators to meet equipment and vehicle "turnover" targets. | None required |
| Air-3, Notice of Preparation 2007 | See Section 4.9, Climate change and greenhouse gas emissions. | | |
| Air-4, Notice of Preparation 2007 | Gravel extraction could increase exposure to naturally occurring asbestos (NOA) | Less than significant. Exemptions to NOA regulation may be allowed if at "crushing, screening and conveying operations, stockpiles, and off-site material transport at a sand and gravel operation... the operation processes only material from an alluvial deposit" (CARB 2006). | None required |

## 4.2 Riparian Habitat Impacts

### 4.2.1 Summary and Evaluation of Uncertain Issues

Issues upon which scientists are not in complete agreement may have implications on the impact analyses of this PEIR. After considering availability of data specific to the Mad River, degree of uncertainty in the issues, and degree of support in peer reviewed literature, one issue (Veg-4) was added as a potential impact of the Proposed Project, see Table 4-2. The Veg-4 impact is that riparian area has not increased since the time when sustained yield extraction was implemented. CDFW scientists' opinion is that riparian habitat area should have increased; CHERT scientists' believe that area alone is not a sufficient indicator for effects on riparian habitat, and that other watershed land uses or high/low flows could also affect riparian habitat area. They also believe that riparian habitat area does not necessarily indicate habitat quality.

**Table 4-2. Evaluation of uncertain riparian habitat issues**

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Table 3-6, row 2. Extraction potentially affects riparian resources on upland historical floodplains. Riparian resources should be improved not just maintained by the Project. | Data are available and they do not support that sustained yield extraction adversely affects riparian resources on upland floodplains. Available data support maintenance but not improvement. | NA | Medium. Direct effects from sustained yield extraction on Mad River floodplains have not been documented; many other land uses could also affect riparian resources. | Low. CHERT reports and conclusions have not been peer reviewed in the broader scientific community. Literature cited by CDFW to support issue was applicable to mining in excess of sustained yield. | Issue not considered further, given riparian protections in Proposed Project description, and low degree of support by existing Mad River data and the literature. |
| Table 3-6, row 3. Extraction makes the riparian vegetation habitat classes younger, which is supported by references stating that mining affects riparian conditions. | Data are available and show that unmined bars also demonstrate lack of riparian vegetation. | NA | Medium. Mining in excess of sustained yield would likely affect riparian habitat age classes, but effects under sustained yield are less certain. | Low. CHERT reports and conclusions have not been peer reviewed in the broader scientific community. Literature cited to support issue was applicable to mining in excess of sustained yield. | Issue not considered further, given riparian protections in Proposed Project description, and low degree of support by existing Mad River data and the literature. |
| Table 3-6, row 7. Use of channelbed types is questionable because "the actual vegetation acreages are masked and unknown." The riparian analyses should "evaluate actual riparian vegetation." | Aerial photos covering many years are available. Whether changing riparian evaluation methodology would support that previous methods are "questionable" is unknown. | NA | Low. Existing methodology indicates riparian area is maintained but not increased. Riparian area analysis by a different method may or may not support existing findings. | Low. Consultant reports* and conclusions have not been peer reviewed in the broader scientific community.<br><br>* NRM 2000a, 2000b, and 2000c; and Trush 2008a | Issue not considered further, given change in methodology would make comparisons with previous reports difficult. |

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Impact Veg-4, from CDFW March 2009 letter. Riparian habitat area has not increased since 1994; the Project has not created more riparian habitat area. | Aerial photographs and trends analyses are available, but how to interpret them so they lead to identifying a baseline is not readily determined. | Highly correlated. The historical aerial photos can be correlated with the extraction volumes that occurred when the photos were taken. However, many other watershed-wide land uses and highly variable water years could also affect riparian area increases or decreases. | Highly certain. CDFW is certain that extraction can and should result in riparian habitat increases. CHERT scientists are equally certain that extraction at sustained yield volumes cannot be the cause of riparian habitat increase or decrease. | That rivers are highly dynamic is well supported in the literature. | Important implications. Without an acceptable baseline and a vision of a desired future condition, the effects of sustained yield extraction on riparian impact cannot be judged. |

### 4.2.2 Impacts Evaluation

Definitions of significant impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Three criteria define a potentially significant impact on riparian habitat. For riparian habitat impacts, a project's effects are potentially significant if the project will:

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or U.S. Fish and Wildlife Service?
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?
- Conflict with any local policies or ordinances protecting biological factors, such as a tree preservation policy or ordinance?

The environmental baseline is considered to be 1992 conditions; therefore full mitigation and avoidance of substantial adverse effect is defined as measures that return sites to at least 1992 conditions. We note that 1992 conditions were not pristine, due to impacts on the river from gravel extraction prior to CHERT, and from land uses in the watershed such as timber production, grazing, residential housing, and transportation. Thus, 1992 conditions are far from pre-European settlement conditions, but serve as a baseline from which to judge the effects of gravel extraction since the early 1990s and of the adaptive management program.

Whether the Proposed Project creates significant impacts on riparian habitat is based on these significance criteria. Numerous impacts were listed in the 1994 PEIR, and one new impact (Veg-4) was added based on agency comments on the 2009 Draft PEIR (CDFG 2009a). Veg-4 is the impact of riparian habitat that has neither increased nor decreased since the operators have been practicing sustained yield extraction. A baseline by which to compare significance will be developed by the regulatory staff and CHERT, and the CHERT adaptive management program has been changed to re-include a riparian and wetlands botanist.

The potential impact of wetland pits by increasing bullfrog habitat is evaluated in the Wildlife Habitat impacts section (Section 4.4). The potential impacts to riparian habitat and the level of significance thereof are summarized in Table 4-3

**Table 4-3. Riparian habitat impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | Riparian Habitat Impact | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| Veg-1, 1994 PEIR | Extraction could remove riparian forests and habitat. | Less than significant. To protect riparian vegetation, the operations' BOs, permit measures, and CHERT practices include avoidance, providing buffers between existing vegetation and extraction areas, transplanting any vegetation that is disturbed, and mitigating for any direct losses. | None required |

| Impact Designation, Source | Riparian Habitat Impact | Impact Determination | Mitigation Required, If Any |
|---|---|---|---|
| Veg-2, 1994 PEIR | Extraction could remove riparian vegetation leading to bank instability and meandering. | Less than significant. Bank erosion is a function of peak flows and geomorphic setting. In upstream bars, the channel bed is generally lowering (elevation is decreasing) and in downstream bars, the channel bed is rising (elevation is increasing). | None required |
| Veg-3, 1994 PEIR | Extraction could affect successional development of gravel bars, terraces, and vegetation. | Less than significant. CHERT recommends extraction from the same general areas, allowing riparian vegetation to go through succession until river processes disrupt the succession. | None required |
| Veg-4, CDFW March 2009 letter | Riparian habitat area has not increased since 1994; the Project has not created more riparian habitat area. | Less than significant. CDFW did not agree with the 1992 biological resources baseline used to determine significance (see Section 3.2.5) but did not specify an alternative baseline. In the June 2009 meeting, CHERT scientists questioned: 1) what a desired riparian condition would be, given the disturbance ecology of the lower Mad River, and 2) whether gravel extraction techniques should be expected to improve riparian conditions that result from watershed-wide land uses. | None required, Project changed so that CHERT team will contract a riparian specialist to assist in reviewing pre-extraction plans, thus continuing to avoid and minimize impacts to riparian vegetation. |

## 4.3 Aquatic Habitat Impacts

### 4.3.1 Summary and Evaluation of Uncertain Issues

Issues upon which resource agencies and CHERT scientists do not agree may have implications on the impact analyses of this PEIR. After considering availability of data specific to the Mad River, degree of uncertainty in the issues, and degree of support in peer reviewed literature, we have identified two issues that scientists do not agree upon, as summarized in Table 4-4. Impacts Fish-7 and Fish-8 are described in this section because they result from aquatic habitat issues; these same fish impacts are repeated in the fisheries impacts section due to their nomenclature of the impacts.

**Table 4-4. Evaluation of uncertain aquatic habitat issues**

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Table 3-9, row 1. Impacts on critical salmon and steelhead habitat should be mitigated by placing LWD instream throughout the Project area. | Low, data on aquatic habitat area and quality, pre- and post- LWD placement, are limited. | Supported by correlation. Declines in salmonids are correlated with extraction but many land uses are causes. | Medium. LWD structures could provide more habitat but uncertain whether they would provide more or healthier fish. | Medium. Efficacy of LWD structures is readily accepted in fisheries literature, but their efficacy in large rivers is less well studied. | See impact Fish -7; installations of LWD are requirements of the 2010 BO, which describes installation of LWD structures at some sites. |
| Table 3-9, row 2. Impacts of increased bank-full width, streambed simplification, and reduced pool depths, should be mitigated by placing LWD throughout the Project area. | Numerous cross sections and aerial photos are available, but data do not support conclusive causes of channel width increases. | Supported and unsupported by correlation. Channel width increases are observed at sites with and without extraction. | Scientists are equally certain on opposing views. | Low. Whether or not sustained yield extraction is a cause of channel widening has not been peer reviewed, and literature supporting a causal link has not been readily found. | See impact Fish-8; installations of LWD are requirements of the 2010 BO, which describes installation of LWD structures at some sites. |

### 4.3.2 Impacts Evaluation

Definitions of significant aquatic habitat impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Using these guidelines, three criteria define a potentially significant impact on aquatic habitats. A project's effects on aquatic habitat are potentially significant if the project will:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, by CDFW, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?
2. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
3. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The environmental baseline is considered to be 1992 conditions; therefore full mitigation and avoidance of substantial adverse effect is defined as measures that return sites to at least 1992 conditions. We note that 1992 conditions were not pristine, due to impacts on the river from gravel extraction prior to CHERT, and from land uses in the watershed such as timber production, grazing, residential housing, and transportation.

Thus, 1992 conditions are far from pre-European settlement conditions, but serve as a baseline from which to judge the effects of gravel extraction since the early 1990s and of the adaptive management program.

Two impacts (Fish-7 and Fish-8) were added to those listed in the 1994 PEIR; CDFW stated that extraction operations can impact critical salmon and steelhead habitat, and can result in increased bank-full width, streambed simplification, and reduced pool depths (CDFG 2009a). The potential impacts to aquatic habitat and the level of significance thereof are summarized in Table 4-5.

**Table 4-5. Aquatic habitat impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | Aquatic Habitat Impact | Impact Determination | Mitigation Required, If Any |
|---|---|---|---|
| Fish-1, 1994 PEIR | Unregulated bar skimming extraction could create broad, shallow channels that impede fish migration. | Less than significant. Bar skimming is regulated by resource agencies through the CHERT program; CHERT's policy of avoiding skimming near the heads of point bars reduces potential channel widening, and reduces the width of transverse bars that could impede migration. No metric specifically measures transverse bar widths, lengths, or durations, although CHERT policy has likely improved transverse bar conditions since 1992. | None required |
| Fish-2, 1994 PEIR | Channel degradation could create barriers at tributary mouths, affecting fish migration. | Less than significant. Sustained yield management appears to have improved fish access at tributary mouths, which reduces the chances of tributary mouths becoming fish passage barriers. | None required |
| Fish-3, 1994 PEIR | Extraction could alter morphology of spawning sites and gravel composition. | Less than significant. A spawning area decrease was noted (Stillwater Sciences 2009) but further review indicates that the data are not comparable between years so no trend is apparent. | None required |
| Fish-4, 1994 PEIR | Extraction could impede juvenile fish migrations due to placement and removal of summer bridges. | Less than significant. Rearing habitat for juvenile salmonids has increased compared to 1970s and 1980s habitat areas. Design and locations of summer bridges are stipulated in LOPs and BOs. | None required |
| Fish-5, 1994 PEIR | Extraction trenches could reduce riffles, affecting juvenile salmonids and macro-invertebrates. | Less than significant. CHERT and operators decide where to locate trenches and alcoves such that riffles are not minimized, reduced, or eliminated | None required |
| Fish-6, 1994 PEIR | Extraction reduces habitat diversity and LWD. | Less than significant. LWD that reaches the sites will be retained, increasing habitat diversity. If LWD enters an extraction site, CHERT recommendations and the LOP requirements ensure that it is retained onsite (Section 2.1.6). However, the public often tries to harvest large wood for firewood. Operators limit public access through controlling roads and posting signs (Section 2.1.6.1). | None required |

| Impact Designation, Source | Aquatic Habitat Impact | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| Fish-7, CDFW March 2009 letter | Extraction creates impacts on critical salmon and steelhead habitat. | Less than significant. Declines in salmonids are correlated with sustained yield extraction but many land uses, hydrologic regimes, and marine conditions are causes. | None required |
| Fish-8, CDFW March 2009 letter | Extraction operations can result in increased bank-full width, streambed simplification, and reduced pool depths. | Less than significant. Bank erosion is correlated with peak flows, and width is primarily dependent on bank material erodibility (see Section 3.3.3). Channel width of upstream sites has increased but at downstream sites it has decreased. At sustained yield extraction rates, no cause and effect has been documented. | None required |

## 4.4 Wildlife Habitat Impacts

### 4.4.1 Summary and Evaluation of Uncertain Issues

Issues upon which resource agencies' and CHERT scientists do not agree may have implications on the impact analyses of this PEIR. After considering availability of data specific to the Mad River, degree of uncertainty in the issues, and degree of support in peer reviewed literature, we have identified four wildlife habitat issues upon which scientists do not agree; they are summarized in Table 4-6.

**Table 4-6. Evaluation of uncertain wildlife habitat issues**

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Table 3-14, row 1. Wildlife survey data shall be analyzed and reported ... If wildlife surveys are lacking then they shall be completed consistent with the original intent of the 1994 PEIR | Low. Wildlife surveys specific to the Mad River gravel extraction are limited. | Had surveys been completed, results would have been correlative; the studies would not have supported causality. | Scientists are equally certain that wildlife surveys: 1) are needed to evaluate Project effects, or 2) will not provide data that indicate Project effects on wildlife. | Low. Species presence or absence to indicate effects on species has not been studied on the Mad River; literature on this from other locations may be available. | This scientific disagreement will be addressed in the CHERT adaptive management process. |
| Table 3-14, row 2. CDFW's policy is to do everything possible to limit bullfrogs | Medium. CDFW is currently planning and implementing bullfrog studies. | NA | Medium. That bullfrogs are red-legged frog predators is certain, but the relative contribution of extraction wetland pits vs. other natural and artificial bullfrog habitats is uncertain. | Medium. That bullfrogs are successful predators is well supported, but data and reports specific to the Mad River have not been peer reviewed or found in the literature. | This scientific disagreement will be addressed in the CHERT adaptive management process. |
| Table 3-14, row 4. Drying out of ponds would be sufficient, but could not say what survivorship could be if bullfrogs are flushed into river by pond turnover. | Medium. CDFW is currently planning and implementing bullfrog studies. | NA | Low. How to balance between providing red-legged frog habitat, which is similar to bullfrog habitat, is uncertain. | Low. Data specific to Mad River are new and are not yet peer reviewed or in the literature. | This scientific disagreement will be addressed in the CHERT adaptive management process. |

### 4.4.2 Impacts Evaluation

"Wildlife habitat" is defined to mean the local riparian habitat of those species discussed in Section 3.2.3. For example, willow flycatcher is a migrant bird that is generally a seasonally present bird using the riparian habitat of the Lower Mad River; therefore, evaluation of impacts covers only the flycatcher's riparian habitat needs.

Definitions of significant wildlife habitat impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Using these guidelines, six criteria define a potentially significant impact on wildlife habitat. A project's wildlife habitat effects are potentially significant if the project will:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, by CDFW, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or U.S. Fish and Wildlife Service?
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
5. Conflict with any local policies or ordinances protecting biological factors, such as a tree preservation policy or ordinance?
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The environmental baseline is considered to be 1992 conditions; therefore full mitigation and avoidance of substantial adverse effect is defined as measures that return sites to at least 1992 conditions. We note that 1992 conditions were not pristine, due to impacts on the river from gravel extraction prior to CHERT, and from land uses in the watershed such as timber production, grazing, residential housing, and transportation. Thus, 1992 conditions are far from pre-European settlement conditions, but serve as a baseline from which to judge the effects of gravel extraction since the early 1990s and of the adaptive management program. CDFW disagrees with the baseline conditions proposed.

The potential impacts to wildlife habitat and the level of significance thereof are summarized in Table 4-7.

**Table 4-7. Wildlife habitat impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | Wildlife Habitat Impact | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| Wild-1, 1994 PEIR | Sustained yield extraction and gravel processing could affect wildlife habitat directly and cumulatively; wildlife habitat is defined as local, riparian habitat. | Less than significant. Riparian vegetation trend analysis indicated little net gain or loss in area from 1994 to 2007, but riparian quality has increased through improvements in extraction techniques (Section 3.2.1). | None required |
| Wild-2, 1994 PEIR | Extraction could create excessive noise on "rare or threatened" wildlife. | Less than significant. A formal information pathway is defined for County staff who regulate noise impacts, to become aware of sensitive species present, and to pass that information to CHERT scientists and gravel operators. | None required |
| Wild-3, 1994 PEIR | Extraction could create dust on riparian vegetation inhibiting plants and insects. | Less than significant. A formal information pathway is defined for NCAQMD staff to inform the operators. Compliance with the dust control plan includes watering roads or using chemical road binders to reduce dust formation during operational hours. | None required |
| Wild-4, 1994 PEIR | Extraction could affect local riparian habitat of TES bird species, specifically the willow flycatcher. | Less than significant. In the operations' BOs, measures for protecting riparian vegetation include avoidance, minimum buffer widths, and mitigating for any direct losses (Section 2.1.6). Riparian vegetation trend analysis indicated little net gain in area from 1994 to 2007, but riparian quality has increased through improvements in extraction techniques (Section 3.2.1.2) | None required |
| Wild-5, 1994 PEIR | Extraction could affect northern red legged frogs, through disturbance of breeding and habitat areas. | Less than significant. The project likely has had beneficial impacts on northern red-legged frog breeding and habitat areas. Aquatic habitat area, as measured by alcove and gravel pit wetland areas, has been monitored annually since 2004. Locations for gravel pit wetlands are selected based on their potential longevity, with recognition that they will evolve and eventually disappear (Section 3.2.2). See Wild-8. | None required |
| Wild-6, 1994 PEIR | Extraction could affect foothill yellow-legged frogs, through disturbance of breeding and habitat areas. | Less than significant. See explanation for northern red legged frog. | None required |

| Impact Designation, Source | Wildlife Habitat Impact | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| Wild-7, 1994 PEIR | Extraction could affect northwestern pond turtles, through disturbance of breeding and habitat areas. | Less than significant. See explanation for northern red legged frog. | None required |
| Wild-8, CDFW Mar 2009 letter | Extraction could affect bullfrogs, by increasing their habitat. | Less than significant. As part of the CHERT adaptive management program, the Project has been changed such that wetland pits are not allowed until studies are performed, | None required. |

As part of the CHERT' adaptive management program, impact Wild-8 was addressed by eliminating the use of wetland pits until the CHERT team and CDFW amphibian specialists design and perform a study that would identify and determine whether additional extraction technique guidelines could be developed to favor red-legged frogs and suppress bullfrogs. Additional extraction techniques could include considering timings, locations, and depths of extraction pits and alcoves.

After the study, and if wetland pits are re-considered as an extraction method, they will be designed and managed to minimize conditions conducive to bullfrog survival. Wetland pits that offer continuous tadpole rearing habitat through two summers, and that support bullfrog tadpoles (using a site-specific census method approved by CDFW) following the second summer, shall be subject to active management directed by CDFW. Active management may include pit de-watering, filling to surrounding grade, or de-populating bullfrogs.

Funding and support for a river-wide bullfrog suppression plan will be sought, given that many local sources of adult bullfrogs can be found inside, as well as immediately outside, the lower Mad River corridor that are beyond the gravel operators' control. CHERT or subcontractors will work with CDFW to research and write a river-wide bullfrog suppression plan. This suppression plan would: (1) identify source populations, (2) better quantify life history periodicity, habitat requirements, and adult movements, (3) define what an acceptable level of bullfrog suppression should be and how it would be measured, and (4) help develop guidelines for excavating gravel within the Mad River's floodplain and terraces.

## 4.5 Fisheries Impacts

### 4.5.1 Summary and Evaluation of Uncertain Issues

Issues upon which resource agencies' and CHERT scientists do not agree affect the impact analyses of this PEIR. After considering availability of data specific to the Mad River, degree of uncertainty in the issues, and degree of support in peer reviewed literature, we have identified three fisheries issues upon which scientists do not agree; they are summarized in Table 4-8.

**Table 4-8. Evaluation of uncertain fisheries issues**

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Table 3-18, row 1. Salmonid spawning habitat decreasing since 2004 (Stillwater Sciences 2009) is a concern. Coho juveniles "are using the mainstem" and "juveniles are trying to rear in the mainstem." Because adults will generally return to spawn where they rear, and because spawning habitat is decreasing, there is concern that sustained yield extraction could affect coho populations. For such impacts, mitigations such as installing LWD structures would be required. | Data supporting the relative use of mainstem vs. tributary habitat for juvenile rearing on the Mad River is limited. | NA | CHERT scientists believe that spawning habitat decrease is due to either: 1) too short of an assessment period, ,2) changes in measuring methods, and/or 3) higher fines in substrate. Spawning in mainstem could be associated with unknown tributary conditions. | Low. Support for either interpretation has not been peer reviewed; studies on effects of sustained yield extraction are limited in the literature. | Requirements of the 2010 BO describe installation of LWD structures at some sites. |
| Table 3-9, row 1. Impacts on critical salmon and steelhead habitat should be mitigated by placing LWD instream throughout the Project area | Low, data on aquatic habitat area and quality, pre- and post- LWD placement, are limited. | Supported by correlation. Declines in salmonids are correlated with extraction but many land uses are causes. | Medium. LWD structures could provide more habitat but uncertain whether they would provide more or healthier fish. | Medium. Efficacy of LWD structures is readily accepted in fisheries literature, but their efficacy in large rivers is less well studied. | See impact Fish -7; installations of LWD are requirements of the 2010 BO, which describes installation of LWD structures at some sites. |
| Table 3-9, row 2. Impacts of increased bank-full width, streambed simplification, and reduced pool depths, should be mitigated by placing LWD throughout the Project area. | Numerous cross sections and aerial photos are available, but data do not support conclusive causes of channel width increases. | Supported and refuted by correlation. Channel width increases are observed at sites with and without extraction. | CHERT scientists think sustained yield extraction does not increase width and decrease pool depths, but resource agency scientists do. | Low. Whether sustained yield extraction causes channel widening has not been peer reviewed, and literature supporting a causal link has not been readily found. | See impact Fish-8; installations of LWD are requirements of the 2010 BO, which describes installation of LWD structures at some sites. |

### 4.5.2 Impacts Evaluation

Definitions of significant fisheries impacts can be based on the "CEQA checklist", which is also known as Appendix G of the CEQA guidelines. Using these guidelines, three criteria define a potentially significant impact on fisheries factors. A project's fisheries effects are potentially significant if the project will:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, by CDFW, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?
2. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
3. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The environmental baseline is considered to be 1992 conditions; therefore full mitigation and avoidance of substantial adverse effect is defined as measures that return sites to at least 1992 conditions. We note that 1992 conditions were not pristine, due to impacts on the river from gravel extraction prior to CHERT, and from land uses in the watershed such as timber production, grazing, residential housing, and transportation. Thus, 1992 conditions are far from pre-European settlement conditions, but serve as a baseline from which to judge the effects of gravel extraction since the early 1990s and of the adaptive management program.

One impact (Fish-9) was added to the potential fisheries impacts listed in the 1994 PEIR; CDFW stated that potential effects on longfin smelt should also be evaluated (CDFG 2009a). The potential impacts to fisheries and the level of significance thereof are summarized in Table 4-9. Given the longfin smelt's life history and the timing of extraction activities, direct impacts are determined to be less than significant. Numerous other factors may affect longfin smelt, such as HBMWD diversions and releases, commercial fishing, and salmonid predation.

**Table 4-9. Fisheries impacts from the Proposed Project are determined to be less than significant (for salmonid impacts see aquatic habitat impacts in Section 5.1.5).**

| Impact Designation, Source | Fisheries Impact | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| Fish-1 to Fish-6, 1994 PEIR<br>Fish-7 and Fish-8, CDFW March 2009 letter | See Table 4-5, Aquatic habitat impacts | | |
| Fish-9, CDFW March 2009 letter | Extraction could affect longfin smelt. | Less than significant. Based on factors likely affecting longfin smelt, conditions could improve. HBMWD surface diversions have ceased and may not resume. Commercial fishing off the coast is also much decreased. Salmonid predation could also be much decreased, due to decreases in salmonid populations. | None required |

## 4.6 Geologic and Hydrologic Impacts

### 4.6.1 Summary and Evaluation of Uncertain Issues

Issues upon which CHERT and resource agency scientists do not agree affect the impact analyses of this PEIR. After considering availability of data specific to the Mad River, degree of uncertainty in the issues, and degree of support in peer reviewed literature, one issue was determined to not require further consideration, as described in Table 4-10.

**Table 4-10. Evaluation of uncertain geologic and hydrologic issues.**

| Issue and Cross-Reference | Degree to which Data Specific to the Mad River are Available to Resolve Issue | Degree to which Issue is Supported by Causality or Correlation | Degree of Certainty in the Scientists' Conclusions | Degree of Peer Review or Support in Literature? | Implications to PEIR Impact Determination |
|---|---|---|---|---|---|
| Table 3-23, row 5. Gravel mining tends to significantly increase bank-full channel widths, which leads to reduced pool depths (Brown et al. 1998). | Numerous cross sections and aerial photos are available, but data do not support conclusive causes of channel width increases. | Channel width increases are observed at sites with and without extraction; correlation is low between channel width increase and nearby extraction | CHERT scientists do not believe that sustained yield extraction increases channel widths, but agency scientists think it does. | Analyses of Mad River data have not been peer reviewed. Literature cited is not directly applicable because it evaluates mining in excess of sustained yield | Issue not considered further |

### 4.6.2 Impacts Evaluation

Compared to the 1994 PEIR, no additional geologic or hydrologic impacts were recognized by resource agency staff or the preparers of this DSPEIR, because the impacts listed in the 1994 PEIR were encompassing and sufficient.

Gravel extraction and the CHERT adaptive management program is based on the assumption that ecological impacts due to extraction are avoided and minimized when: 1) sustained yield management limits extraction volume, and 2) extraction techniques and locations are properly designed and implemented. In comments on the January 2009 Draft SPEIR and in subsequent meetings, CDFW stated that they do not agree with this assumption, but they do state support for the CHERT adaptive management process (CDFG 2009a).

Based on the assumption that sustained yield extraction and carefully designed extraction designs will avoid and minimize geologic impacts, yet recognizing that scientists disagree, we propose that a potentially significant impact on geomorphic factors occurs if the project inhibits, minimizes, or prevents sustained yield management or implementation of properly designed extraction techniques and locations. The potential geologic and hydrologic impacts associated with the Proposed Project and the level of significance thereof is summarized in Table 4-11.

**Table 4-11. Geologic or hydrologic impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | Geologic or Hydrologic Impact | Impact Determination | Mitigation Required, If Any |
|---|---|---|---|
| Morph-1, 1994 PEIR | Extraction could cause "excessive" channel degradation that jeopardizes structures. | Less than significant. The Project supports sustained yield management and extraction will be maintained within a range of estimated mean annual recruitment and annual fractional extraction volumes, and below the cap set by COE. Generally, in upstream bars, the channel bed is lowering (elevation is decreasing) and in downstream bars, the channel bed is rising (elevation is increasing). | None required |
| Morph-2, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects aquatic habitat. | Less than significant. See Table 4-5 for detailed evaluation of potential aquatic habitat impacts. | None required |
| Morph-3, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects groundwater elevations. | Less than significant. In the 1994 PEIR, channel degradation was assumed to lift river terraces above the river, lower the water table, and produce a corresponding migration of phreatophytic vegetation, riparian habitat, and wetland habitat towards the river thalweg. Riparian habitat area has not substantially increased or decreased since 1994 but riparian habitat quality has increased through extraction techniques such as wetland pits and alcoves, and by avoidance of areas that could mature into riparian habitat. | None required |
| Morph-4, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects bank stability. | Less than significant. CHERT monitors river banks by reviewing cross section surveys, and increases stability by discouraging removal of riparian vegetation. CHERT established that bank erosion is primarily a function of peak discharge and geomorphic setting. | None required |
| Morph-5, 1994 PEIR | Extraction could cause "excessive" channel aggradation or degradation that affects channel flood carrying capacity. | Less than significant. Generally, in upstream bars, the channel bed is lowering (elevation is decreasing) and channel width is increasing, however, similar increases in width and bank erosion affect both mined and unmined sites. In downstream bars, the channel bed is rising (elevation is increasing) and bank erosion is dependent on bank material stability. | None required |
| Morph-6, 1994 PEIR | Extraction could cause "excessive" channel degradation that affects "river resources" as documented by site specific effects. | Less than significant. To address site specific conditions, pre-extraction designs are annually reviewed for each site, and post-extraction activities are also monitored and reviewed. Gravel pit wetlands have been constructed on Christie, Blue Lake, and Emmerson bars. | None required |

## 4.7 Water Quality

### 4.7.1 Summary and Evalution of Uncertain Issues

Water quality issues are sufficiently certain to allow impact evaluation.

### 4.7.2 Impacts Evaluation

Section 3.4.4 defines a potentially significant suspended sediment impact as one that causes nonconformance with the gravel extraction operation's General Waste Discharge Requirements and its Section 401

Certification . In addition, Section 3.4.4 defines a potentially significant temperature impact as a temperature increase or decrease resulting from an aspect of the CHERT program that does not fulfill the narrative or quantitative water quality objectives for temperature. The quantitative water quality objective for cold water habitats is "at no time or place shall the temperature of any COLD [water with a beneficial use of cold freshwater habitat] water be increased by more than 5°F above natural receiving water temperature" (NCRWQCB 2007). The potential water quality impacts associated with the Proposed Project and the level of significance thereof are summarized in Table 4-12.

In 1994, the Mad River TMDL for suspended sediments had not been performed. Since then, the the EPA now estimates that for the entire Mad River basin, dominant natural sediment-producing sources are landslides, and dominant management related sources are roads (USEPA 2007a). Landslides and roads contribute 62% of the sediment in the basin as a whole. In the Lower/North Fork subarea, 73% of the suspended sediment is road related, which is consistent with the highest road densities in the Mad River basin being found in the Lower/North Fork subarea (USEPA 2007a). Gravel extraction was not considered a source in the modeling assessments that are the bases of the TMDLs.

In 1994, concern was expressed that gravel extraction would create dust and sediment on the extracted surfaces, such that when the first elevated flows of the year occurred, turbidity would increase. Based on the EPA's TMDL evaluations, gravel extraction is likely not a significant source of suspended sediment during high flows. Similarly, in 1994, summer bridges and crossings were also thought to be potentially significant sources of suspended sediment. Again, the EPA's TMDL evaluation did not consider summer bridges and crossing associated with gravel extraction to be significant sources of suspended sediment.

Changes in channel width are more dependent on annual peak flows and the erodibility of bank material than by extraction skimming, as discussed in Section 3.3.3. Because skimming does not increase channel width causing shallower flows, increased water temperature is not caused by skimming.

**Table 4-12. Water quality impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | Water Quality Impacts | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| H2OQlty-1, 1994 PEIR | Extraction could cause a short-term increase in suspended sediment, as measured by turbidity, during high flows. | Less than significant. Based on the EPA's TMDL evaluations, gravel extraction is likely not a significant source of suspended sediment during high flows. | None required |
| H2OQlty-2, 1994 PEIR | Summer bridges or crossings could cause a short-term increase in suspended sediment, as measured by turbidity, during low flows. | Less than significant. Based on the EPA's TMDL evaluations, summer bridges are likely not a significant source of suspended sediment. | None required |
| H2OQlty-3, 1994 PEIR | Extraction by skimming could increase channel width and water temperature. | Less than significant. Skimming and increased channel width are not causal; channel width is correlated to annual peak flows and bank material. | None required |

| Impact Designation, Source | Water Quality Impacts | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| H2OQlty-4, 1994 PEIR | Extraction equipment could spill or leak petroleum products on to the gravel bar, which could be entrained when flows increase in the winter. | Less than significant. Operations will comply with and fulfill requirements of their WDRs and will follow Best Management Practices.. | None required |

## 4.8 Utilities and Public Services

### 4.8.1 Summary and Evaluation of Uncertain Issues

Utilities and public services issues are sufficiently certain to allow impact evaluation.

### 4.8.2 Impacts Evaluation

A potentially significant impact on in-channel structures is an adverse condition resulting from sustained yield gravel extraction or other aspects of the CHERT program that cause repair work greater than that considered routine maintenance. The public utilities impacts associated with the Proposed Project and the level of significance thereof are summarized in Table 4-13.

**Table 4-13. Public utilities impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | In-Channel Structure Impacts | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| PU&S-1, 1994 PEIR | Mad River Fish Hatchery weir, and rock slope protection, RM 11 | Less than significant impact because the weir is no longer used and State agencies would like to remove the weir and its associated rock slope protection, thus any continued degradation would not require repair work. | None required |
| PU&S-2, 1994 PEIR | Bank stabilization ("rip rap") on Hatchery Road, RM 9.7 | Less than significant impact. This location is inherently dynamic, as evidenced by the need for emergency measures in 2005. Some recent bank erosion at gaps in riprap is unrelated to gravel extraction. Pre-extraction plans for Guynup and Emmerson bars recommend volumes and techniques that minimize effects on the bank stabilization. | None required |
| PU&S-3, 1994 PEIR and PU&S-4, 1994 PEIR | Hatchery Road Bridge (called Blue Lake bridge in 1994 PEIR), and Blue Lake right bank levee, RM 9.4 | Less than significant impact. Since 1992, mean elevation increased slightly at Blue Lake bar from 1993 to 1997, but then decreased from 1997 to 2003 for a net degradation from 1993 to 2003. It presently appears secure. Extraction plans for nearby operations will recommend volumes and techniques that minimize effects on the bank stabilization. | None required |
| PU&S-5, 1994 PEIR | Blue Lake sewage ponds and levee, RM 8.7 | Less than significant impact. Extraction will be limited to sustained yield extraction volumes, to minimize effects of degradation on sewage ponds and levees. | None required |

| Impact Designation, Source | In-Channel Structure Impacts | Impact Determination | Mitigation Required, if Any |
|---|---|---|---|
| PU&S-5.1 | Power's Creek | Less than significant impact. Appears stable but remains a fish migration barrier. Limiting extraction to sustained yield extraction volumes will decrease rate of degradation. NMFS and partners are pursuing plans for a fish access structure to aid passage. | None required |
| PU&S-6, 1994 PEIR | Highway 299 Mill Cr bridge, RM 7.0 | Less than significant impact. The site has a new (2012) concrete fish ladder structure that both stabilizes the channel bed elevations and ensures fish passability. | None required |
| PU&S-7, 1994 PEIR | North Coast RR Authority bridge and water line, RM 6.2 | Less than significant impact. Aggradation is currently minimizing impacts already experienced during past periods of channel degradation. | None required |
| PU&S-8, 1994 PEIR | Glendale Drive bridge over Lindsay Cr, RM 6.1 | Less than significant impact. Bridge was recently re-built and channel appears passable to fish. Aggradation is likely to minimize elevational differences between Lindsay Creek and the Mad River. | None required |
| PU&S-9, 1994 PEIR | Highway 299 bridge over Lindsay Cr, RM 6.1 | Less than significant impact. Channel appears passable to fish. Aggradation is likely to minimize elevational differences between Lindsay Creek and the Mad River. | None required |
| PU&S-10, 1994 PEIR | Railroad trestle over Warren Cr, RM 5.3 | Less than significant impact. Aggradation is likely to reduce pier scour. Recently reconstructed bridge supports will likely tolerate channel. elevation changes in a dynamic river system | None required |
| PU&S-11, 1994 PEIR | Warren Cr Road bridge, RM 5.3 | Less than significant impact. Bridge appears stable and channel appears passable to fish. | None required |
| PU&S-12, 1994 PEIR | Structures of the HBMWD, between RM 4.6 and 5.9 | Less than significant impact. Aggradation is likely to reduce scour around the Ranney collectors and at the direct intake. | None required |
| PU&S-13, 1994 PEIR And PU&S-14, 1994 PEIR | Upper and lower HBMWD water pipe crossing, RM 4.9 and RM 4.0 | Less than significant impact. Aggradation is likely to reduce scour around the pipe crossings. | None required |
| PU&S-16, 1994 PEIR | Highway 299 bridges, RM 4.0 | Less than significant impact. Aggradation has reduced scour around the bridge footings. | None required |
| PU&S-17, 1994 PEIR | PG&E upper gas line via the Highway 299 bridge | Less than significant impact. Aggradation has reduced scour around the bridge footings.. | None required |
| PU&S-17.1 | McKinleyville Community Services District water pipe crossing, RM 3.4 | Less than significant impact. Aggradation is likely to reduce scour around the pipeline crossing. | None required |
| PU&S-18, 1994 PEIR | Highway 101 bridge, RM 1.8 | Less than significant impact. New construction brings bridge supports up to current design standards. | None required |
| PU&S-19, 1994 PEIR | Hammond Trail bridge RM 0 | The bridge marks the end of the project area of the 1994 PEIR. Recent surveys indicate the aggradation found upstream also extends to this reach. | |

## 4.9 Climate Change and Greenhouse gas Emissions

### 4.9.1 Summary and Evaluation of Uncertain Issues

No climate change and GHG emissions issues are lacking consensus.

### 4.9.2 Impacts Evaluation

Whether the Proposed Project creates significant impacts on climate change and GHG emissions is based on the significance criterion proposed in Section 3.7.2. Neither the County nor the State has defined significance levels or thresholds for GHG emissions or reductions. However, a goal of the County's "Climate Action Plan" is to achieve GHG emissions equivalent to 90% of those occurring in 2003 by 2020 (1.10 million tons/yr CO2e). Therefore, CO2e emissions due to gravel extraction covered in this SPEIR are considered significant if the sources' emissions result in the County exceeding its 2020 CO2e goal of 1.10 million tons/yr.

The primary sources of GHG emissions during gravel extraction are from vehicles and heavy equipment. Operators were asked to estimate their diesel fuel usage per season, based on transporting:

- Equipment to and from extraction sites
- Raw material to stockpile areas
- Stockpiled material to processing yards
- Raw material to job sites (assume 50-mile distance)
- Processed material to job sites
- Employees from extraction to processing to job sites

This usage corresponds to that considered in the traffic analysis of the 1994 PEIR. In this PEIR, operators estimated a wide range of annual diesel use, from 250 to 72,000 gallons, based on current extraction rates. Using the online Greenhouse Gas Equivalencies Calculator[9], and assuming 72,000 gallons were used to extract 54,565 $yd^3$ of gravel, 0.012 tons CO2e is emitted per $yd^3$ of gravel. If the maximum sustained yield extraction volume is 175,000 $yd^3$, a maximum of 2,100 tons CO2e would be emitted. The calculator is supported by the US EPA, and is frequently updated; its most recent update was October 2012.

As an approximate comparison, we reviewed the tons CO2e emitted by the Syar Gravel Extraction Project on the Russian River in Sonoma County, as summarized in Table 4-14; their estimates were based on a model performed by an environmental consultant. The volume of gravel extracted by the Syar Project is approximately 28% higher than the maximum sustained yield estimated for the Mad River. However, the distance assumed for Syar's transport of material was shorter (12 mi vs. 50 mi). Using a much more sophisticated model than the methods used here, the estimated tons of CO2e emitted from Russian River gravel extraction of 225,000 $yd^3$ is 958 tons CO2e per year, which is approximately half of that estimated with an online CO2e calculator.

Using the Syar ratio of CO2e emitted to gravel volume extracted, and assuming the maximum Mad River gravel extracted of 175,000 $yd^3$/yr, 745 tons CO2e per yr would be emitted.

9 http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

Therefore, an estimated range of CO2e emissions from Mad River gravel operations is 745 to 2100 tons CO2e per yr. This range assumes a ratio of gallons fuel per $yd^3$ gravel extracted of 0.91, which was the highest fuel use estimated by Eureka Ready Mix (Table 2-6); the fuel usage estimates from Mercer Fraser and GR Sundberg were less by two orders of magnitude.

**Table 4-14. Estimated CO2e emitted from Syar (AECOM 2010) and Mad River gravel operations**

| Source | Syar (Russian River) | Mad River operators | Mad River operators |
|---|---|---|---|
| Volume extracted, $yd^3$ per yr | 300,000 tons x 0.75 $yd^3$/ton = 225,000 $yd^3$ | 175,000 (max sustained yield) | 175,000 (max sustained yield) |
| Method of estimating tons of CO2e | Site specific model | Online CO2e calculator | Ratio of CO2e to volume extracted, Syar site specific model |
| Total CO2e, ton per yr | 958 | 2100 | 745 |
| County's 2020 goal of CO2e emissions (90% of 2003 emissions), tons/yr | NA | 1,100,000 | |
| CO2e emitted by Proposed Project compared to 2020 emissions goal, % | NA | 0.19% | 0.07% |

The CO2e emissions due to gravel extraction covered in this SPEIR are considered significant if the sources' emissions result in the County exceeding its 2020 CO2e goal of 1.10 million tons/yr. Using the range of 745 to 2100 CO2e tons/yr, gravel extraction covered in the SPEIR would represent 0.07% to 0.19% of the County's 2020 CO2e emissions goal. This is a conservative estimate because it is based on 175,000 $yd^3$ of gravel extracted, which is the maximum sustained yield that would be allowed, and it would not be allowed in consecutive years. Therefore, as shown in Table 4-15, GHG emissions impact from the Proposed Project are determined to be less than significant.

**Table 4-15. GHG emissions impacts from the Proposed Project are determined to be less than significant.**

| Impact Designation, Source | GHG Emissions Impact | Impact Determination | Mitigation Required, If Any |
|---|---|---|---|
| Air-3, Notice of Preparation 2007 | Diesel vehicles could emit and increase "greenhouse gases" (GHG). | Less than significant. Future CO2e emissions from the Proposed Project are determined to be 0.07% to 0.19% of the County's 2020 CO2e emissions goal of 90% of the County's 2003 emissions, or 1.1 million tons/yr. | None required |

Another significance criterion that has been used in determining the impacts of GHG emissions is whether the design and characteristics of the project are inherently energy-efficient (ESA 2008). The Proposed Project provides for a more readily available and local source of gravel for construction projects; thus the Proposed Project has the advantage of decreasing transportation distances and GHG emissions compared to projects that would import gravel from outside the county.

# 5 DESCRIPTION OF ALTERNATIVES

An EIR must describe "a reasonable range of feasible alternatives to the project...that could feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the significant environmental impacts of the Proposed Project" (Bass et al. 1999). In the 1994 MOU and PEIR, the purpose of the PEIR was stated as "...to evaluate the cumulative effects of gravel extraction and of channel degradation, whatever the cause, on the natural resources, public utilities, and structures in and along the Mad River." The 1994 preferred alternative, which has become this Draft SPEIR's Proposed Project, is a "plan to develop, implement, and monitor flexible, comprehensive, environmentally-sound mining strategies and reclamation standards that will provide a moderate rate of recovery from past degradation at critical sites while attempting to provide for continued commercial extraction of Mad River riverrun sand and gravel and while protecting significant riverine resource values."

Re-stating from above and from the Purpose and Objectives section, the project objectives are to:

- Evaluate the cumulative effects of gravel extraction and of channel degradation, whatever the cause, on the natural resources, public utilities, and structures in and along the Mad River, and
- Develop, implement, and monitor flexible, comprehensive, environmentally-sound mining strategies and reclamation standards that will provide a moderate rate of recovery from past degradation at critical sites while attempting to provide for continued commercial extraction of Mad River river-run sand and gravel and while protecting significant riverine resource values.

Besides attaining most of the project objectives, alternatives to the Proposed Project can also be defined as those that:

1. accomplish the same objectives but at a different location(s)
2. accomplish the same objectives but cause fewer or less severe environmental impacts
3. are considered by the public to be important or desirable

In addition, an EIR must include a "no project" analysis. "When the project is the revision of an existing...regulatory plan, policy, or ongoing operation, the no project alternative will be the continuation of the plan, policy, or operation into the future" (Bass et al. 1999). Continued gravel extraction and the CHERT adaptive management program is an ongoing operation; therefore, the "no project" alternative is the Proposed Project, which is continued gravel extraction with the CHERT adaptive management program[10].

Four alternatives have been considered in this Draft SPEIR. They were formulated in consideration of the project's purpose and objectives, alternative locations, and decreased or lesser environmental impacts. They are:

Alternative 1. Continue to extract gravel from the Mad River, with an administrative change in the CHERT adaptive management program by reinstating the Surface Mining Advisory Committee (SMAC). Alternative 1

[10] In emailed comments dated 16 March 2009, NMFS stated confusion between the Proposed Project, the preferred alternative, and the "no action" alternative. The "no project" alternative is the same as the Proposed Project. The preferred alternative is identified in Section 5.4.

is largely based on comments received during the NOP's public comment period. This alternative calls for major administrative changes in the CHERT adaptive management program, by reinstating a Board of Supervisors advisory committee formerly called the Surface Mining Advisory Committee (SMAC).

Alternative 2. Continue to extract gravel from the Mad River, with an administrative change of disbanding the CHERT scientist team, and having County staff take on CHERT scientist responsibilities. Alternative 2 calls for disbanding the CHERT team but the adaptive management program would still continue with County staff taking over the CHERT scientists' activities. The adaptive management program would remain the same except for the removal of the CHERT team.

Alternative 3. Obtain river-run gravel from sources outside of watershed, discontinuing gravel extraction on the Mad River. Alternative 3 calls for extracting gravel from sources outside of the Mad River watershed but within Humboldt County, such as the Eel River-Van Duzen River complex, Willow Creek, and the Trinity River. In Mendocino County, gravel sources include the Russian River, and in Del Norte County, gravel is extracted from the Smith River. Gravel would then be transported to markets formerly supplied by Mad River gravel, via trucks. "A common assumption is that the cost of transporting sand and gravel typically doubles for each 35 miles that it is transported" (HCDCDS 2012). The scope of the CHERT adaptive management program would likely decrease dramatically, under Alternative 3.

Alternative 4. Obtain river-run gravel from Mad River upland terraces, using pit mining techniques. Alternative 4 calls for mining (in contrast to sustainably extracting) gravel from terraces that are considered outside of the channel; mining outside of the channel would limit effects on in-channel resources, but would increase effects on upland terraces. The changes in upland habitat would be essentially permanent because replenishment of gravel on upland terraces would likely not occur for many hundreds of years, until the next very large but infrequent flood inundates the upland terraces. The CHERT adaptive management program would need to change dramatically to focus mitigation and effects evaluations on upland and terrestrial (rather than riparian and aquatic) habitats. The CHERT team would need to increase its range of expertise by either changing members and/or hiring subcontractors.

An initial screening of the four alternatives was performed (Table 5-1), primarily using the project's purposes and objectives as screening criteria.

**Table 5-1. Initial screening of four alternatives**

| Initial Screening Considerations | Alternatives | | | |
|---|---|---|---|---|
| | 1. Continue to Extract on Mad, Reinstate SMAC | 2. Continue to Extract on Mad, Disband CHERT Scientist Team | 3. Obtain Gravel from Other Watersheds | 4. Obtain Gravel from Upland Terraces |
| Evaluates cumulative effects on Mad River | Yes | Yes, but assumes County staff can fill CHERT scientists' roles | No, does not meet purpose and objectives | No, does not meet purpose and objectives |
| Provides moderate rate of recovery from past mining on Mad River | Yes | Yes, but assumes County staff can estimate a mean annual yield or other sustainable extraction volume | Yes | Yes, creation of terrace pits could increase in channel recovery, but impacts on upland terraces would be much longer lasting |

| Initial Screening Considerations | Alternatives | | | |
|---|---|---|---|---|
| | 1. Continue to Extract on Mad, Reinstate SMAC | 2. Continue to Extract on Mad, Disband CHERT Scientist Team | 3. Obtain Gravel from Other Watersheds | 4. Obtain Gravel from Upland Terraces |
| Provides for continued commercial extraction on Mad River | Yes | Yes | No, does not meet purpose and objectives | Yes, but the operators may not be the same, would depend on land owners of upland terraces |
| Meets objectives at another location(s) | No | No | Yes | No |
| Meets objectives with fewer or lesser significant impacts | No, review and adaptive mgt would take more time, creating shorter extraction periods, or allowing extraction to extend through November, which would leave less time for restoration | No, review and adaptive mgt would take more time, creating shorter extraction periods, or allowing extraction to extend through November, which would leave less time for restoration | No, transportation and greenhouse gas emission impacts increase. Moving impacts from one location to another without mitigating them | No, extraction of terraces would be unsustainable mining because gravel recruitment on to terraces would require major and infrequent flooding, causing permanent habitat change |
| Addresses public comments | Yes | No | No | No |

## 5.1 Alternatives Not Considered for Further Analysis

Based on initial screening, alternatives not considered for further analysis are Alternatives 3 and 4 because they do not meet the project's purpose and objectives and because their significant environmental impacts are likely higher than those of the Proposed Project or Alternatives 1 and 2.

The environmental impacts from Alternative 3 are likely higher than those from the Proposed Project and Alternatives 1 and 2 because gravel extracted elsewhere would require longer transportation distances to serve the same markets that Mad River gravel would have served. Greater hauling distances would require greater diesel use and higher greenhouse gas emissions. Alternative 3 does not meet important parts of the Project's purpose and objectives. It does not evaluate cumulative effects since the CHERT program began, and it does not allow for continued gravel extraction on the Mad River. Alternative 3 does accomplish transfer of potential impacts due to gravel extraction from one location (the Mad River) to other locations (most likely to the Eel-Van Duzen river complex, or the Smith and Klamath rivers.

The environmental impacts from Alternative 4 are likely higher than those from the Proposed Project and Alternatives 1 and 2 because mining on terraces is not sustainable unless very high flows, which occur at very low frequencies, inundate upland terraces and replenish upland terrace material. The most likely upland areas to mine gravel are terraces currently supporting agriculture or grazing; these land uses are protected by current zoning designations. Mitigation for upland terrace gravel mining is usually restoration to a habitat that is different than the previous habitat. For example, after pit mining, restoration may be to a pond and wetland habitat, where before there was upland terrace habitat. Similar to Alternative 3 but on a more local

scale, Alternative 4 transfers potential impacts from one location (in channel) to another (upland terraces) but does not decrease impacts, and in fact may increase them.

Therefore, Alternatives 3 and 4 are not considered for further analysis.

## 5.2 Alternative 1, Reinstating the SMAC

Alternative 1 was formulated based on comments received on the NOP, and calls for reinstating the Surface Mining Advisory Committee (SMAC) and including it in the adaptive management program. The primary activities performed by each stakeholder group under Alternative 1 are listed in Figure 5-1.

# Alternative 1. Reinstate the SMAC* Committee

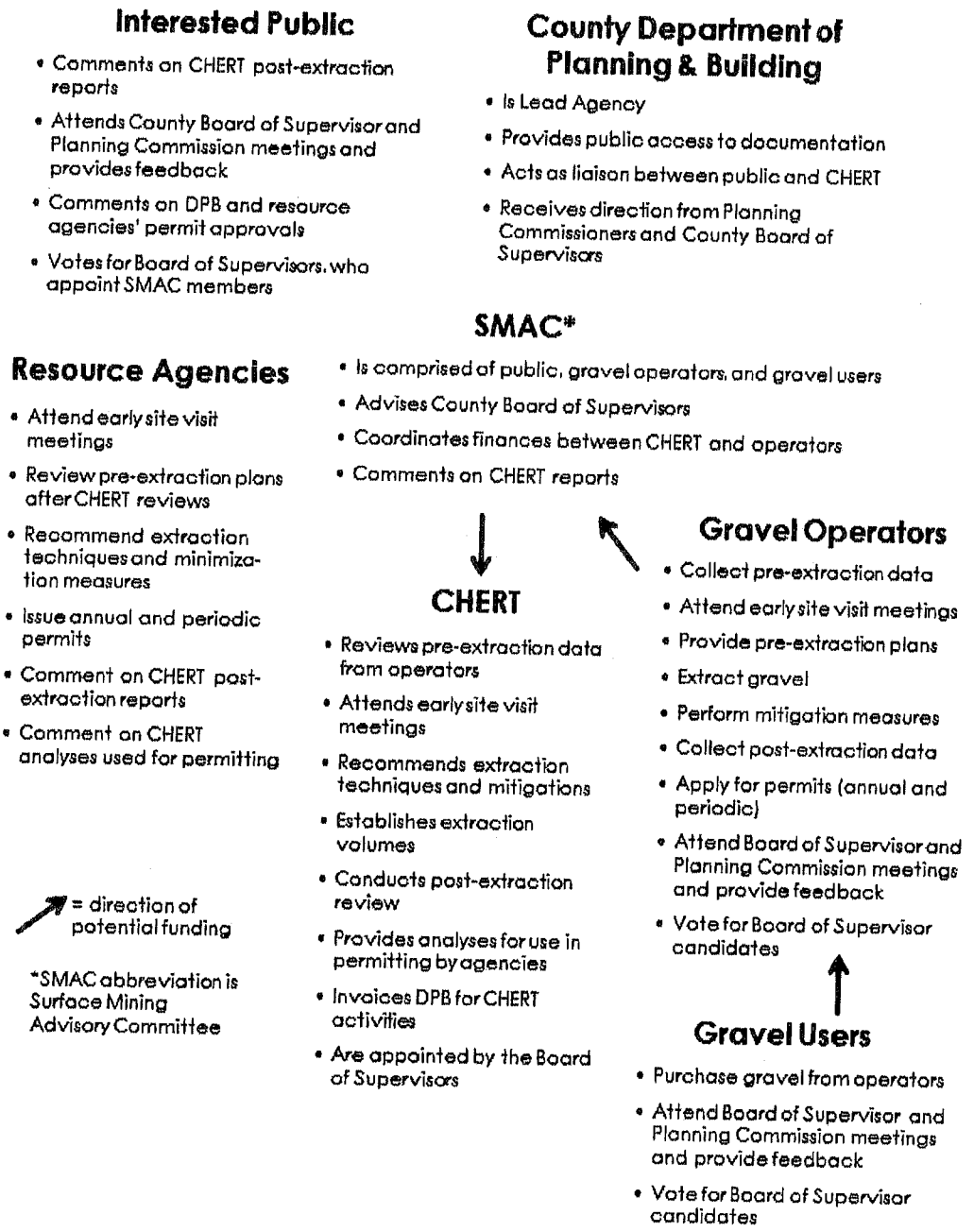


**Figure 5-1. This flowchart describes flow of information, funds, and gravel under Alternative 1, which is reinstating the SMAC and continuing the CHERT adaptive management program.**

### 5.2.1 Objectives of Alternative 1

The objectives of Alternative 1 are identical to those of the Proposed Project.

### 5.2.2 Formation and Administration of Alternative 1

The formation and administration of Alternative 1 is similar but not identical to that of the Proposed Project. The primary difference between Alternative 1 and the Proposed Project is that Alternative 1 calls for reconvening the Surface Mining Citizen's Advisory Committee (SMAC).

The SMAC was a group of citizens who met during the mid-1990s, to discuss surface mining concerns. At that time, most of the SMAC members were gravel operators or their representatives. Because the committee was a recognized advisory group to the Board of Supervisors, it presumably had some method of direct contact with the Board and possibly with the Director of the Humboldt County Planning & Building Department. Members of the SMAC included representatives of local environmental organizations and of gravel extraction operations. If a SMAC group reconvened, membership would be from the public at large, but a head or leader would be elected to speak for the group.

If a SMAC group reconvened, its roles and responsibilities could include:

- Sending a representative to attend early site visits with agencies, CHERT, and operators
- Coordinating finances and fees between the CHERT team and operators
- Commenting on and reviewing CHERT post-extraction reports

The purposes and intents of a reconvened SMAC group, based on NOP comments, could be:

- to increase the public's access to the CHERT team specifically, and the CHERT adaptive management program generally,
- to better obtain CHERT reports and other documentation,
- to decrease perceived conflict of financial interest between CHERT team members and gravel operators.

Adding another stakeholder group to the CHERT adaptive management program will likely increase time required from all CHERT program stakeholders, for administration, review, and communication. Coordinating early site visits would require scheduling an additional person (the chair or other representative of the SMAC). Closer access to the CHERT team will probably not result in more timely receipt of post-extraction reports, because report delay is generally caused by occasionally delayed or late post-extraction data from a few operators, CHERT team members' other commitments and scheduling conflicts, and the County's delay in posting the reports online. Adding another reviewing stakeholder would likely delay reports more. Recently, however, reports were prepared and made available for public review in a timelier manner than occurred before, and this will likely continue due, in part, to the heightened public interest. For example, the post-extraction report for 2012 was available by written by February 2013 and posted shortly thereafter.

The perception of financial conflict of interest was greater prior to the 4th quarter of 2007, when CHERT team members were paid directly by the operators. Presently, CHERT payments are handled by the County, which decreases the potential for perceived conflict. For SMAC to coordinate finances between CHERT team members and gravel operators, it too would need to be funded (see Section 5.2.4), raising program costs and delaying payments to CHERT.

### 5.2.3 Technical and Environmental Activities of Alternative 1

The technical and environmental activities of Alternative 1 are identical to those of the Proposed Project. Activities could be delayed due to time required for comments and responses by another stakeholder. The potential for miscommunication is also greater when the number of parties in a conference, conversation, or meeting increases.

Under this alternative, the public's adaptive management input would be received by three entities, the County Planning & Building Department, the SMAC, and the Board of Supervisors.

### 5.2.4 Funding Mechanism of Alternative 1

Alternative 1 calls for the CHERT team members to be funded by the SMAC. As one NOP commenter stated, "This way CHERT would have no conflict of interest; there would be a checked and balanced oversight and public participation..." (Voice 2007, see Appendix A). One way this could occur would be as follows (Figure 5-1):

1. Operators pay fees to the County
2. CHERT members invoice SMAC
3. SMAC reviews and approves invoices, and recommends their payment to the County
4. County staff disburse funds to SMAC
5. SMAC disburses funds to CHERT

For the County to disburse funds to SMAC, SMAC would likely need, at the minimum:

- Papers filed with the County and State, to allow it to be an entity that can hold a bank account and file taxes
- A contract with the County to review CHERT invoices and accept funds to be passed on to CHERT
- Insurance such that the County can recover its funds, should SMAC fail to honor its contract

Even if all SMAC members volunteered their time, expenses would be incurred for bank fees and insurance premiums. The source for funds to cover SMAC expenses could be:

- increased fees to gravel operators
- the County's Planning & Building Department funds
- the County's general funds
- contributions to SMAC as a non-profit corporation
- private funds

For SMAC to be involved in CHERT funding, its own source of revenues to cover expenses would need to be reliable. The most reliable source of the five above is increased fees to gravel operators.

### 5.2.5 Regulatory Setting of Alternative 1

The regulatory setting of Alternative 1 is identical to that of the Proposed Project, in terms of the types of permits and approvals required, and the agencies involved. Adding the SMAC representative to field meetings, and responding to SMAC comments, may require more agency staff time.

### 5.2.1 Potential Impacts and Mitigation Measures of Alternative 1

Alternative 1, continuing sustained yield gravel extraction and reinstating the Surface Mining Advisory Committee (SMAC), was described in Section 5.2. Table 5-2 summarizes that many of the potential impacts from Alternative 1 are the same as those from the Proposed Project. However, differences in impact evaluations are apparent in two factors: fisheries and water quality.

**Table 5-2. Impact determinations of Alternative 1. Many impact determinations are the same as those of the Proposed Project, and a section reference is provided.**

| Resource Potentially Impacted | Impact Determination |
|---|---|
| Air quality | Less than significant, see Section 4.1.2 |
| Riparian habitat | Less than significant, see Section 4.2.2 |
| Aquatic habitat | Less than significant, see Section 4.3.2 |
| Wildlife habitat, specifically local riparian habitat | Less than significant, see Section 4.4.2 |
| Fisheries | Potentially significant, less than significant with mitigation, see Section 5.2.1.1 |
| Geologic and hydrologic | Less than significant, see Section 4.6.2 |
| Water quality | Potentially significant, less than significant with mitigation, see Section 5.1.7 |
| Utilities and public services | Less than significant, see Section 4.8.2 |
| Climate change and GHG emissions | Less than significant, see Section 4.9.2 |

#### 5.2.1.1 Fisheries and Water Quality Impacts

Reinstating the SMAC (Alternative 1) has a potentially significant impact on fisheries and water quality, in that accommodating SMAC review could affect the timing of gravel extraction. Additional review could cause extraction to start later and continue later into the wet season, causing a hurried approach to mining reviews and post-extraction site preparations for winter flows; significant fisheries and water quality impacts could occur, and thereby significantly impact fisheries and water quality.

The mitigation for this potentially significant effect is to limit SMAC review to post-extraction and summary technical reports; that is, SMAC would not review the pre-extraction plans. With this mitigation, the impact of Alternative 1 to fisheries and water quality would be less than significant with mitigation.

The primary potential advantage of reinstating the SMAC is increased public access to the CHERT program; currently the public can indirectly access the CHERT program through the County Board of Supervisors and the County Department Planning & Building staff.

The benefit of increased public access to the CHERT program is less than the fisheries and water quality impacts associated with Alternative 1. Public review of the pre-extraction plans would likely delay the extraction season, and the later the extraction period extends into the late fall, the greater the short- and long-term ecological impacts could be, due to the greater chance that post-extraction activities will not have been completed. If sites are not be properly closed for the season, fall and winter flows could increase suspended sediment, affecting water quality and aquatic resources. The feasibility of timing fall/winter flows with extraction windows of opportunity is less under Alternative 1 than under the Proposed Project. Alternative 1 would not change the volume of extracted gravel, so Alternative 1's cumulative effects would be the same as the Proposed Project's.

## 5.3 Alternative 2, Replacing the CHERT Team with County Staff

Alternative 2 calls for disbanding the CHERT team but continuing the adaptive management program, with County staff taking over the CHERT team's activities. The adaptive management program would remain the same in form except for the removal of the CHERT team. With the issuance of NMFS' 2010 BO, NMFS staff appears to be willing to estimate extraction volumes; one possibility is that NMFS staff could perform the extraction volume calculations, with County staff performing the rest of the CHERT duties. The primary activities performed by each stakeholder group under Alternative 2 are listed in Figure 5-2.

# Alternative 2. Replace CHERT with staff from HCDP&B

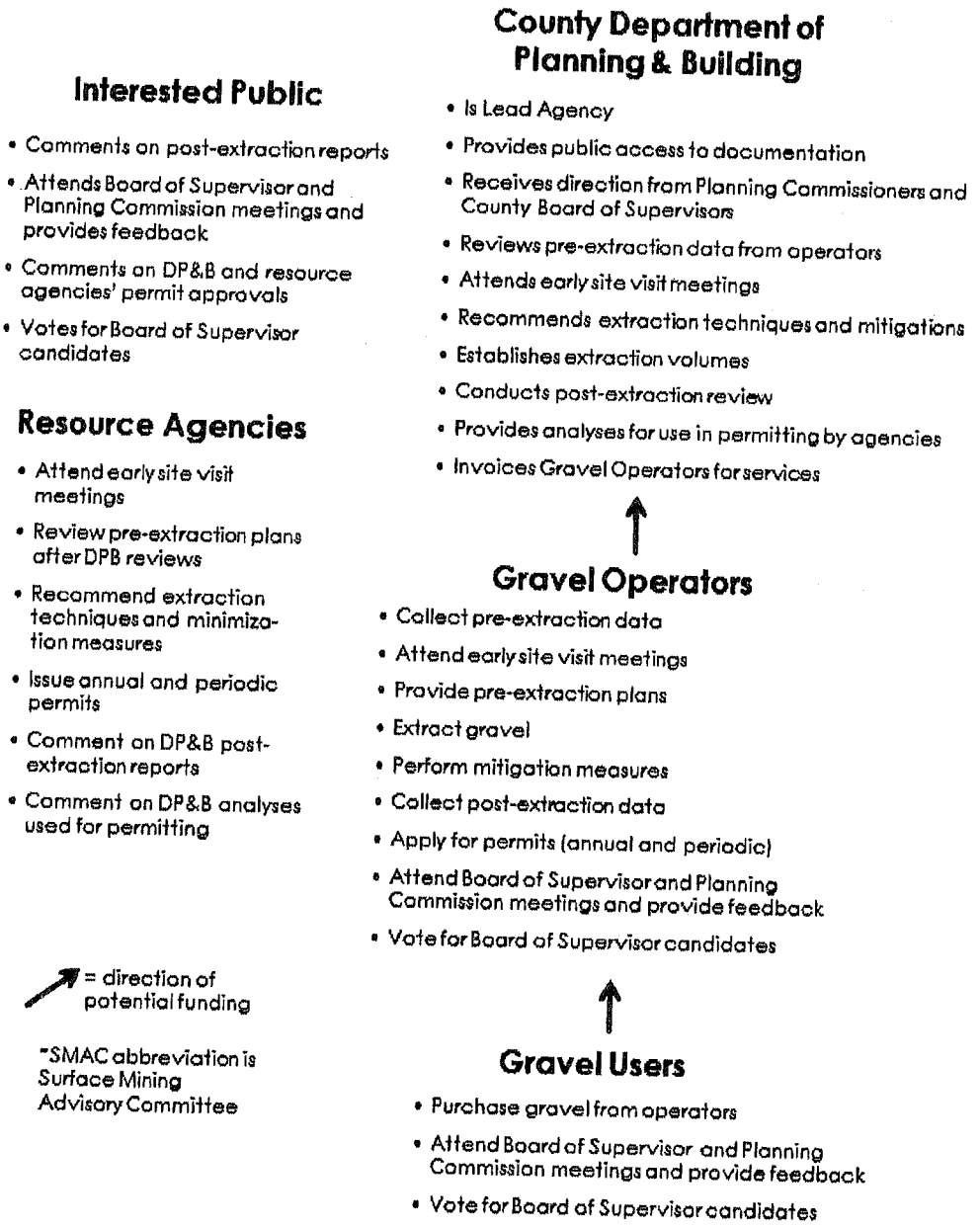


**Figure 5-2. This flowchart describes the flow of information, funds, and gravel under Alternative 2, which replaces the CHERT team with County staff.**

### 5.3.1 Objectives of Alternative 2

The objectives of Alternative 2 are identical to those of the Proposed Project (see Section 2.2.1).

### 5.3.2 Formation and Administration of Alternative 2

To fully describe Alternative 2, many assumptions and considerations are made but would have to be verified, should Alternative 2 become the preferred alternative. First, we assumed that current County staff is unable to assume CHERT responsibilities due to: 1) existing obligations, and/or 2) lack of technical expertise. Therefore, the County would need to obtain additional qualified staff by either hiring new employee(s) or contracting to consultants. If the County contracted consultants, then this alternative would be similar to the Proposed Project; therefore, this alternative assumes the County would either hire new employee(s) and/or train existing employee(s).

To be technically comparable to the current CHERT members, potential employee(s) hired to perform CHERT activities would need to be senior-level scientists versed in geomorphology, surface hydrology, fisheries biology, and wildlife and botanical riparian ecology, as well as gravel extraction. Finding candidates who are willing to work part-time, but who are also knowledgeable in the required disciplines, could prove difficult. Similarly, training and educating existing employees to become senior-level scientists in these disciplines could also prove difficult.

Based on total CHERT invoice amounts from 1999 to 2007, the four CHERT members' workload varies considerably throughout the year, and does not represent a full-time position on an annual basis (see Section 2.2.5). However, on a seasonal basis, the work performed by CHERT as a whole amounts to greater than a full-time position. During the "mining season," one person would be unable to attend all site visits, analyze all pre-extraction plans, and write all extraction recommendations. This is particularly true when the mining season is short due to high flows in late spring. A single person would be unable to review all of the pre-extraction plans in time for extraction and mitigation to occur. Therefore, to cover gravel extraction review in the spring and summer, multiple County employees would need to be available.

Inspectors of the Building Division, within the County Planning & Building Department, visit gravel extraction sites annually, to fulfill requirements under the Surface Mining and Reclamation Act (SMARA). However, a different division (the current Planning Division) is the SMARA Lead Agency for Humboldt County. People who are either hired or educated to perform CHERT activities could be employed by either of these Divisions.

Once candidates are hired or otherwise selected by the County, CHERT member(s) would need to teach the new employees how the CHERT adaptive management program works, and what the specific CHERT team responsibilities are. Once the CHERT team is replaced by County staff, the Board of Supervisors could formally disband the CHERT team, yet still maintain the adaptive management program.

### 5.3.3 Technical and Environmental Activities of Alternative 2

The technical and environmental activities of Alternative 2 are similar to those of the Proposed Project (see Section 2.2.4). The time between receipt of pre-extraction plans, to recommendation and approval of permits, would entirely depend on how the County could allocate staff time; review would likely take longer

than under the Proposed Project. However, the availability of County-wide post-extraction reports and any summary reports could be earlier than under the Proposed Project scenario, again depending on how the County could allocate staff after the extraction season, for reviewing the operators' post-extraction reports, and writing the summary County-wide report.

Summary reports and historical analyses of geomorphic data have not become routine; to perform analyses encompassing all extraction sites, the sites' cross sections must be "relatable" to each other. This has not proved to be the case in any of the historical analyses performed so far. Geographic data as recently collected as 2004 to 2007 still required verification and correction before cross sections and other data could be used for analyses of the lower river.

Under this alternative, the public's adaptive management input would be received by two entities, the County Planning & Building Department (either the Building or Planning division), and the Board of Supervisors.

### 5.3.4 Funding Mechanism of Alternative 2

The funding mechanism for Alternative 2 would be straightforward; i.e., the operators would pay fees to the County and the County would pay employees' wages. In the short-term, costs to operators would likely increase, as new County employees learn how the adaptive management plan works, yet CHERT team members would still be reviewing plans and visiting sites. In the long-term, assuming that the new County employees can and do perform all CHERT team activities satisfactorily, costs to operators may remain about the same as the Proposed Project's costs.

### 5.3.5 Regulatory Setting of Alternative 2

The regulatory setting of Alternative 2 would be significantly different from that of the Proposed Project. Permits and agreements between operators and agencies (including COE, NMFS, and CDFW) specify that CHERT reviews and recommends pre-extraction plans. If CHERT were replaced with County staff, these permits would need to reflect that change in the reviewing entity. Permits and documents that would need to change include the LOPs and the BOs and others. Time for review and approval of pre- and post-excavation plans, and for approval of any Conditional Use Permits for operations that change, could decrease due to streamlining of communications, but could also increase depending on the staff hours that the County could devote to pre-extraction review.

### 5.3.6 Potential Impacts of Alternative 2

Similar to the Proposed Project, all of the long-term potential impacts from Alternative 2 are less than significant, as summarized in Table 5-3. However, the short-term impacts of Alternative 2 are similar to the impacts of Alternative 1, which are potential fisheries and water quality impacts. These impact determinations assume that the County can replace the CHERT scientists with comparably knowledgeable staff, however, adaptive management program delays are likely until County staff become familiar with the it. As described under Alternative 1, training of less experienced County staff could cause extraction to start later and continue later into the wet season, causing a hurried approach to mining reviews and post-extraction site preparations for winter flows; significant fisheries and water quality impacts could occur. Assuming that County staff becomes more experienced, the short-term impact would decrease over time, and no mitigation is proposed.

**Table 5-3. Impact determinations of Alternative 2. Many impact determinations are the same as those of the Proposed Project, and a section reference is provided.**

| Resource Potentially Impacted | Impact Determination |
|---|---|
| Air quality | Less than significant, see Section 4.1.2 |
| Riparian habitat | Less than significant, see Section 4.2.2 |
| Aquatic habitat | Less than significant, see Section 4.3.2 |
| Wildlife habitat, specifically local, riparian habitat | Less than significant, see Section 4.4.2 |
| Fisheries | Less than significant, see Section 4.5.2 |
| Geologic and hydrologic | Less than significant, see Section 4.6.2 |
| Water quality | Less than significant, see Section 4.7.2 |
| Utilities and public services | Less than significant, see Section 4.8.2 |
| Climate change and GHG emissions | Less than significant, see Section 4.9.2 |

Compared to the Proposed Project, the potential benefit of Alternative 2 is that better communication is possible, because County planning staff, decision makers, resource agency staff, and operators would communicate directly, with no communication line through the CHERT scientists. The potential disadvantages include the increased time that County staff will need to become proficient at the adaptive management program, and the relatively high risk of whether the County will be able to hire or retrain staff with the proper credentials and experience needed. If these two disadvantages can be overcome, potential impacts to fish and aquatic and wildlife habitat could be significant in the short-term, but less than significant in the long-term. Alternative 2 would not change the volume of extracted gravel, so Alternative 2's cumulative effects would be the same as the Proposed Project's.

## 5.4 SELECTION OF THE PREFERRED ALTERNATIVE

The preferred alternative is the Proposed Project, which is the continuance of sustained yield extraction and the CHERT adaptive management program. The Proposed Project and the two alternatives were compared using a number of criteria, as in Table 5-4. The comparison is qualitative; no attempt was made to assign numerical importance or weight on the criteria. The fewest negative signs are assigned in the Proposed Project column; therefore the selected project is the Proposed Project.

**Table 5-4. Comparison of Proposed Project and Alternatives.**

| Criterion | Proposed Project, Continue Extraction and CHERT Program | Alternative 1, Continue Extraction and CHERT, and Reinstate SMAC | Alternative 2, Continue Extraction, Replace CHERT Team with County Staff |
|---|---|---|---|
| Extent to which the Proposed Project or alternative reduces ecological impacts to less than significant | + | + | + |
| Extent to which the Proposed Project or alternative reduces ecological impacts in the short-term | + | + | – |
| Extent to which the Proposed Project or alternative reduces ecological impacts in the long-term | + | – | + |

| Criterion | Proposed Project, Continue Extraction and CHERT Program | Alternative 1, Continue Extraction and CHERT, and Reinstate SMAC | Alternative 2, Continue Extraction, Replace CHERT Team with County Staff |
|---|---|---|---|
| Extent to which the Proposed Project or alternative reduces cumulative impacts | + | + | + |
| Ease of implementation by County | + | – | – |
| Ease of implementation by operators | + | – | – |
| Ease of implementation by resource agencies | + | – | – |
| Feasibility in terms of timing of winter flows and mining windows | + | – | + |
| Public acceptance | + | + | – |
| Public participation | – | + | + |
| Total negative signs | 1 | 5 | 5 |

[a] Longer review times resulting from reinstating the SMAC could cause extraction to extend closer to the high flow season (late fall/early winter); this could cause decreases in water quality and greater fisheries impact.

## 5.5 Selection of the Environmentally Preferred Alternative

The environmentally preferred alternative is also the Proposed Project.

# 6 SUMMARY OF SIGNIFICANT IMPACTS THAT CANNOT BE AVOIDED

Significant effects that cannot be avoided were not identified.

# 7 OTHER STATUTORY CONSIDERATIONS

## 7.1 Growth Inducing Impacts

CEQA Guideline 15126.2(d) requires an EIR to include a discussion of growth inducing impacts that would result from implementation of a project. The Guidelines state that an EIR must:

> *"Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also, discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment."*

Growth inducing impacts address the implications of the project for growth inducement in the project vicinity or broader area. Under CEQA, a project is generally considered to be growth inducing if it results in any of the following:

1. Extension of urban services or infrastructure into a previously un-served area;
2. Extension of a transportation corridor into an area that may be subsequently developed; or
3. Removal of obstacles to population growth (such as designation of an area for development that is not currently designated for development, or provision of major new public services to an area where those services are not currently available).

The Proposed Project would not include private on-site septic systems and would not require sewer service from sewer service provider. Nor would the Project require any additional other urban services such as waste pick-up, storm drainage service, or additional sheriff services. Thus the Project would not result in the extension of urban services or infrastructure into a previously un-served area. In this respect, the Project would not be growth inducing.

The Project would not provide street access to parcels that do not already have such access. In this respect, the Project would not be growth inducing.

An Urban Expansion Boundary identifies areas that are rural in nature, may be suitable for development of one unit per acre or more, and for which services and infrastructure are currently inadequate to permit a greater density. Because the Proposed Project does not involve any residential development that would be inconsistent with existing General Plan land use designations and zoning, the Proposed Project has been planned for by the County. Furthermore, the Project will not designate an area for development that is not currently designated for development, and it will not remove regulatory obstacles to population growth. In these respects, the project will not be growth inducing.

## 7.2 Short vs. Long Term Impacts

The river's geomorphology is dynamic, and aquatic and riparian habitat areas and quality will be constantly changing even in the absence of gravel extraction. Some of the Proposed Project's activities increase riparian and aquatic habitat in the short-term; an example of this is the wetland pit created on Christie bar (Section 4.2.2). In this specific example, the benefits of the wetland pit lasted for less than 5 years, which can be considered short term. Similarly, any riparian vegetation removed or habitat disturbed is immediately mitigated (Section 2.1.6), so adverse effects are also short term. The Proposed Project's primary long term effect is maintaining sustained yield gravel extraction. Based on the analyses from 1994 to 2007 (13 years), which coincides with the management change to sustained yield extraction, riparian habitat area has remained approximately the same. Future surveying and monitoring will determine whether this is a long term trend that will continue past the 13 years.

## 7.3 Irreversible Environmental Changes

One irreversible environmental effect due to the Proposed Project is the use of diesel fuel. As part of the activities to improve air quality and reduce greenhouse gas emissions, diesel fuel use will be minimized. These activities and the benefits associated therewith are summarized in Sections 4.1 and 4.9.

## 7.4 Discussion of Cumulative Impacts

Cumulative impacts are defined by CEQA Guidelines Section 15355 as "two or more individual effects, which, when considered together, are considerable or which compound or increase other environmental impacts." Specifically, "the cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." (CEQA Guidelines Section 15064(h)(1).) "Where an agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable." (CEQA Guidelines Section 15130(a))."

CEQA Guidelines Section 15130(b)(1) specifies the need to provide either of the following as part of a cumulative setting to ensure adequate discussion of significant cumulative impacts:

- A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

- A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document that has been adopted or certified, that describes or evaluates regional or area-wide conditions contributing to cumulative impacts. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.

Since the 1994 PEIR was certified, only one new gravel mine site has been permitted and gravel was extracted for the first time in 2011. The Blue Lake Rancheria is the operator of this project; and as a sovereign nation, they are not required to obtain permits from the State of California or the County of Humboldt. The mining plans for the Blue Lake Rancheria gravel project are reviewed by NMFS and the COE, but CHERT does not review or receive extraction information from the Blue Lake Rancheria. According to Rancheria staff, their permit allows extraction of approximately 20,000 yd3 of gravel per year.

The Proposed Project and Blue Lake Rancheria project are closely related and both will contribute to some cumulative impacts in the Lower Mad River. However, even assuming a cumulative impact to a resource exists, a project's contribution thereto is not necessarily cumulatively considerable. This is the case for the Proposed Project because implementation of the CHERT Program and the practice of sustained yield extraction allows the river to "recover" from extraction over the long term. Furthermore, CHERT oversees the extraction methods and locations utilized by the Proposed Project, as detailed in the Draft SPEIR.

As a result, the Proposed Project does not compound or increase any potential impacts that may result from gravel extraction when viewed in connection with other related projects. Accordingly, the Proposed Project's incremental effects on the environment are not cumulatively considerable.

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# Attachment 4

## Draft Supplemental Program Environmental Impact Report for Gravel Extraction on the Lower Map River Vol. 2 Appendices