UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

2010/01235:RAB

JUL - 8 2010

Larry Mosler
Mosler Ojai Quarry
PO Box 502
Newbury Park, CA 91319

Dear Mr. Mosler:

NOAA's National Marine Fisheries Service (NMFS) visited the Mosler Ojai Quarry (Quarry) on April 15, 2010, to validate concerns that a rockfall from the Quarry is causing a passage barrier to endangered steelhead (*Oncorhynchus mykiss*) in the North Fork Matilija Creek (North Fork). NMFS greatly appreciates you providing a tour of the facility and general overview of the related activities undertaken at the Quarry. Quarry activities take place along 0.31-miles of the east bank and floodplain bordering the North Fork (hereafter "Quarry reach").

Having toured the facility and inspected the Quarry reach, NMFS' primary concern in regards to the Quarry operation involves the introduction of rock to the creek and related creation of a passage impediment for steelhead, which evidence indicate exists in the Quarry reach. Evidence further suggests that the presence of a rockfall-induced passage impediment in the Quarry reach is not a new problem. For instance, since the 2006 landslide at the north end of the Quarry reach, the Quarry slopes have been a frequent source of rock and fine sediment entering the North Fork. Given the extensive areas of exposed soil, there exists a high potential for sediment-laden runoff to the creek during rain events, which is of concern owing to the reported effects of fine sediment on aquatic habitat and stream fish. The sediment-detention basins that NMFS observed at the north and south ends of the property bordering the North Fork appear to be insufficient for capturing moderate to high sediment loads. NMFS' observations noted during the April 15, 2010, site inspection, and resulting concerns relative to the life history and habitat requirements of endangered steelhead, are described more fully in the attached memorandum.

Based in part on NMFS observations of the Quarry reach, NMFS recommends the Quarry undertake the following measures to remediate the existing observable effects of the Quarry activities on endangered steelhead and habitat for this species, and reduce the potential for future effects:

1. Removal of a minimum of five instream boulders that are creating a fish-passage barrier.
2. Removal of any loose boulder riprap armoring on the east bank of the Quarry property.
3. Hire a licensed contractor to stabilize streambanks to minimize the likelihood of future rockfalls.

4. Implement a revegetation plan to rehabilitate the barren landscape and erodible quarry slopes.
5. Redesign both sediment basins to adequately capture all property sediment runoff.
6. Develop a sediment removal plan that maintains adequate basin sediment-capture capacity.

NMFS is extremely grateful for your expressed willingness to remediate the ongoing and prevent future adverse impacts to steelhead and designated critical habitat for this species in the North Fork. In this regard, the recommended remediation measures identified in this letter will further attainment of long-term benefits to the species. The attached memorandum provides the technical support for our recommendations. Please call Rick Bush at (562) 980-3562 if you have any questions or if you require additional information.

Sincerely,

for

Rodney R. McInnis
Regional Administrator

cc: Bill Struble, NOAA OLE
Mary Larson, CDFG
Antal Szijj, USACE
Roger Root, USFWS
Amy Miller, USEPA
Ejigu Solomon, LA-RWQCB
Kim Rodriguez, Ventura County Planning Division
Steve Bennett, Ventura County Supervisor's Office
Ebony McGee, Ventura County Resource Management Agency
Bill Hicks, CMWD
Kira Redmond, SBCK
Copy to Administrative File 151422SWR2010PR00125

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

2010/01235: RAB

JUL - 8 2010

MEMORANDUM FOR: Mosler Rock-Ojai Quarry Recommendations

FROM: Rick A. Bush
Fishery Biologist, Regulatory Steelhead Team
Protected Resources Division

SUBJECT: Effects of Mining Activities on Endangered Steelhead in the North Fork Matilija Creek

I. Overview

A March 2006 landslide occurred at the northernmost boundary of the Mosler Rock-Ojai Quarry (Quarry) active mining area that constricted the North Fork Matilija Creek (North Fork) floodplain by introducing 250 to 400 cubic yards of boulder-size sandstone (U.S. Army Corps of Engineers 2006). Due to the steep nature of the modified Quarry slopes combined with the unstable rock and sediment that was exposed during the recent landslide event (i.e., no longer stabilized with vegetation), the Quarry slope as it currently exists within the project area has the potential for a major failure into the North Fork resulting in significant adverse impacts (Edaw Inc. 1993). Based on a review of available information, NOAA's National Marine Fisheries Service (NMFS) has determined that the migration route for endangered steelhead (*Oncorhynchus mykiss*) is currently blocked by a turbulent boulder cascade barrier at the site of the 2006 landslide. The exposed sediment is of concern because the potential exists that the sediment is continuing to be introduced into the river, settle, and reduce the quality and availability of habitat for this species. The migratory route obstruction represents an alteration that substantially impairs the capability of endangered steelhead to access spawning and rearing habitats farther upstream in the North Fork, and reduces the availability of such habitat for this species. This memorandum documents and describes the basis for this determination.

II. Background

The North Fork provides greater than 5 miles of spawning habitat upstream of the Quarry (Figure 1). The landslide at the north end of the Quarry property in March 2006 created a steelhead passage barrier, and a resulting constriction in the North Fork channel (Figure 2). The U.S. Army Corps of

Engineers (Corps) met with Ojai Quarry owner Larry Mosler onsite April 19, 2006, to assess the landslide area on the Quarry property. The Corps subsequently determined that a Clean Water Act

section 404 permit was not warranted at the time because no fill material was willfully discharged into the North Fork, but recommended installation of a semi-permanent barrier to prevent Quarry

materials from entering the waterway (Corps 2006). The Los Angeles Regional Water Quality Control Board (RWQCB) issued a Cleanup and Abatement Order (Order) to the Quarry on June 28, 2006, that requires implementation of a stormwater-management plan that prevents discharge of pollutants (e.g., fine sediment) into the North Fork. The Order required the Quarry to effectively stabilize the slope adjacent to Matilija Creek, reduce or eliminate erosion from the mining area and install de-silting basins.

NMFS and the California Department of Fish and Game (CDFG) expressed concerns in regards to the fish-passage barrier caused by the 2006 landslide, which resulted in CDFG issuing the Quarry a Streambed Alteration Agreement (Agreement) on August 2, 2006. The Agreement authorized the removal of rocks and boulders from the North Fork using a crane from the top of the bank along Highway 33, and recommended streambank stabilization measures (CDFG 2006). Although the reason is not known to NMFS, Quarry operators did not remove the boulders during the 2006 dry period (i.e., May 1 – December 1) in accordance with the Agreement. In response to the continued existence of the unnatural steelhead passage barrier and impaired water quality, an interagency site visit was coordinated on March 6, 2007, between the Quarry operator, CDFG, NMFS, Corps, RWQCB, Ventura County Supervisors' office, and the local State Mining and Reclamation Act office. CDFG and NMFS biologists recommended a plan of action, identifying the specific boulders that needed to be removed, and describing methods for preventing further Quarry materials from entering the North Fork. CDFG sent a letter to the Ventura County Planning Division (County) on June 25, 2007, requesting County approval to allow the Quarry to increase the number of trucks removing material from the Quarry in order to build a boulder catch bench to increase slope stability. As of October 2007, the Quarry operator addressed the short-term recommendations made at the March 6, 2007, meeting, including: 1) installation of k-rail along 100-feet of the mine access road, 2) removal of boulder fish barrier in the North Fork, and 3) enlargement of the north sediment detention basin. The Quarry operator did not submit the Revegetation/Mitigation plan for CDFG review per Agreement stipulation.

The solutions carried out by the Quarry operator on September 17, 2007, in response to the fish passage and fine sediment problems in the Quarry reach provided short-term fish passage, but did not address the long-term bank stabilization causing the rockfalls. By February 2008, another boulder barrier had formed in the North Fork where the 2006 landslide had constricted the stream channel. In response to the unnatural reoccurrence of a boulder barrier at the same location, NOAA's Office of Law Enforcement (OLE) and CDFG biologists arranged a second on-site meeting at the Quarry on February 20, 2008, to make additional recommendations to the Quarry operator on how to improve steelhead passage through the Quarry reach and stabilize Quarry slopes to prevent future rockfalls. However, the Quarry operator did not attend the meeting, but NOAA OLE and CDFG marked boulders for the Quarry operator to remove that they determined were blocking steelhead passage for a second time at this location. The regulatory agencies continued to follow-up on their recommendations and orders for the Quarry to become compliant with county, state and federal laws and regulations. The Santa Barbara Channelkeeper (SBCK) issued a letter of March 24, 2008, on behalf of numerous concerned organizations echoing the same recommendations raised by

the regulatory agencies, and further documented the need for improved stormwater management practices to prevent the runoff of fine sediment into the North Fork from the Quarry property.

The Casitas Municipal Water District (CMWD) sent a letter to the regulatory agencies on March 26, 2008, requesting that a concerted effort be made to provide evaluation and guidance toward an effective solution at the Quarry. The Corps responded to the CMWD in a letter sent May 5, 2008, that clarified the Corps' role in regulating the discharge of dredged or fill material into U.S. waters, and requested any evidence indicating the Quarry operator was willfully placing rock fill within the banks of the North Fork. The Corps issued copies of their letter to all previous engaged regulatory agencies and informed the collective group of their intent to coordinate a set of collective recommendations to the Quarry with the key resource agencies involved. The Corps took the lead on the Quarry fish passage and sedimentation problems by coordinating on-site visits and facilitating communications between the agencies and the Quarry operator. As part of this concerted effort, the RWQCB amended their Order on October 24, 2008, to allow the Quarry additional time to receive approval of their Reclamation Plan from the County of Ventura in order to address Quarry slope stability by building an erratic boulder catch bench (i.e., widening their internal haul road) at the north end of the Quarry reach. For clarification, this "slope stabilization" project was performed to stabilize upslope areas outside of the North Fork floodplain, and is different from the streambank stabilization recommendations made to the Quarry by NMFS and CDFG.

The boulder barrier remained in place as of the beginning of the 2008 steelhead spawning migration. On December 10, 2008, NOAA's OLE in coordination with the Corps arranged a third on-site meeting to assemble all interested agencies in an effort to help find a long-term solution to the sedimentation, water quality and fish passage issues at the Quarry. This meeting was attended by NOAA OLE, NMFS, CDFG, Corps, RWQCB, County, California Department of Transportation, and the Quarry operator. At this meeting, a written description of all Quarry streambank stabilization work was requested by the Corps. On January 21, 2009, the Corps received a letter from the Quarry describing the streambank stabilization work that was completed at the southern (i.e., downstream) end of the Quarry reach. NMFS and CDFG were apparently copied on this letter, but neither agency received a copy of this correspondence.

One-year later following heavy rains, NMFS staff conducted another Quarry site visit on January 24, 2010, in an effort to monitor the efficacy of the work performed by the Quarry to prevent rockfalls and sediment runoff from the property. Once again, additional rock material from the north end of the Quarry reach had fallen into the creek at the same point where boulders have blocked steelhead passage in the past. On February 26, 2010, the RWQCB issued a Notice of Violation indicating that the Quarry was not in compliance with their general permit guidelines regulating storm water discharges associated with an industrial activity. Members of the NMFS Division of Protected Resources Steelhead Team inspected the lower 0.5 RM of the North Fork as well as the Quarry mining area on April 15, 2010, to determine if streambank alterations on the Quarry have harmed endangered steelhead.

III. Site Description

This 0.31-mile streamside Quarry parcel and the adjacent North Fork that flows adjacent to State Route 33 (SR-33) will be referred to as the "Quarry reach" in this memorandum. The sediment-detention basins constructed at both the north and south ends of the property bordering the stream

were created by the Quarry with the intent of controlling the runoff of fine sediments that originate from the Quarry property. The upstream basin is an excavation about 10-feet depth surrounded by large boulders on the western perimeter (Figure 3). The detention basin at the downstream end of the property appears to be about 6-feet deep, reinforced with concrete ecology blocks on the stream side and is at the receiving end of two corrugated drainage pipes that drain rainwater and suspended sediment from the property (Figure 4).

IV. Methods

NMFS collected in-stream barrier measurements, Quarry reach site photographs, and on-site observations during a site visit on April 15, 2010. The purpose of our site visit was to evaluate reports that rockfalls from the Quarry had created instream fish passage barriers in the North Fork and to evaluate potential source inputs of fine sediment into the Ventura River watershed. We considered information indicating the type and extent of habitat alterations to the river channel, and integrated this information with knowledge of Southern California steelhead biology and ecology, and the reported effects of habitat alterations on aquatic habitat and stream salmonids. The methods are described more fully as follows.

Two NMFS biologists and one hydrologist conducted a steelhead barrier assessment on April 15, 2010, from the confluence of the North Fork where it meets Matilija Creek upstream to the CA State Route-33 Bridge No. 52-67 (SR-33 mile marker 17.77). A total of 0.50 North Fork river miles (RM) were surveyed overall, of which 0.31 RM are considered part of the Quarry reach as previously described (Figure 1). The entire 0.50 RM survey reach was walked to identify potential barriers to adult steelhead migration based on NMFS (2001) salmonid passage guidelines and data presented in Powers and Orsborn (1985). Quantitative assessments were performed during the stream survey of each structure believed to be an impediment to adult steelhead upstream migration. Analysis techniques are based on combining barrier geometry and stream hydrology to define the existing hydraulic conditions within the barrier. These conditions can be compared to known fish capabilities to determine fish passage success. Each potential barrier was assessed for the following parameters, 1) barrier type, 2) jump pool depth, 3) vertical jump height, and 4) horizontal jump distance. North Fork fish passage data will be evaluated using the relationship between jump height and jump pool depth (NMFS 2001), and the leaping capabilities of adult steelhead presented in Powers and Orsborn (1985). The Powers and Orsborn values were derived from the steelhead maximum burst speed of 26.5 feet/second measured by Bell (1973). The passage criteria used is based on the assumption that the coefficient of fish condition (Cfc) will be 0.75, which correlates to good fish condition (i.e., in the river for a short time; spawning colors apparent but not fully developed; still migrating upstream) upon arrival at the base of any potential barrier.

Current Quarry conditions were photo-documented during the April 15, 2010, site visit. With permission from the Quarry operator, photographs were taken not only from the SR-33 right-of-way and within the floodplain, but specific areas of the Quarry. Quarry reach site photographs taken during the time period of March 2007 to April 2010 were obtained from the Mosler Quarry, NMFS, NOAA OLE, RWQCB, and SBCK for comparison of current to preexisting conditions. Site photography of the Quarry reach and the 2006 landslide slope provide an important monitoring tool that documents compliance with CDFG Agreements, RWQCB Orders, Corps regulations on use of fill and NMFS recommendations. Photographs provide a qualitative,

and potentially semi-quantitative, record of conditions in a watershed or within a stream channel. These photographs will be used to document changes in general conditions on the Quarry reach of a stream, assess resource conditions over time, and document temporal progress for restoration efforts or other projects designed to benefit water quality.

V. Results

The North Fork stream temperature ranged 11.5 - 14.0° C, and streamflow was measured to be 13.2 cubic feet/second (Ventura County Gage #604) at the time of the barrier assessment. The mainstem Ventura River streamflow downstream was measured at 45 cubic feet/second (USGS Gage # 11118500). Based on Evans and Johnston (1980) in-stream depth requirements for resident trout (0.15-meter) and steelhead (0.30-meter) passage, there was more than adequate stream depth for steelhead to migrate through the barrier-free portion of the lower North Fork.

Steelhead Barrier Assessment

Based on our instream measurements and site observations made on April 15, 2010, angular Quarry boulders located at the base of the 2006 landslide slope in the active channel have created a turbulent cascade barrier with a maximum jump height of 2.15 meters (i.e., measured from jump pool surface to upstream pool crest), a jump pool depth of 0.45 meters and a horizontal distance of 6.0-meters (Figure 5). NMFS (2001) guidelines for salmon and steelhead passage state that a jump pool depth of at least 1.5 times the jump height is required for successful steelhead passage over instream barriers. The measured elevation drop created by the instream boulders was also determined to be in excess of the steelhead jumping ability reported in Powers and Orsborn (1985). Therefore, at the current streamflow of 13.2 cubic feet per second (cfs) in the North Fork and mainstem Ventura River flow of 45 cfs, this turbulent cascade barrier creates a complete stream barrier to upstream migrating adult steelhead. This barrier also impedes the seasonal movements of juvenile steelhead in search of tributary refugia that provide lower water temperatures and seasonal feeding areas. Other boulder impediments observed and measured in the 0.31-mile Quarry reach during the site visit were determined to be partial barriers to juvenile and adult steelhead, but all were evaluated as passable to adults at flows of 13.2 cfs or greater. NMFS spawning ground surveys in the Ventura River and San Antonio Creek this year indicated that steelhead are actively migrating through the Ventura River and spawning at mainstem flows of approximately 30 cfs and above, and that steelhead would likely spawn in the North Fork if passage were possible based on the presence of spawning substrate that exists upstream of the Quarry barrier.

It is important to note that the fish passage barrier in the Quarry reach is classified as a turbulent boulder cascade. This type of barrier is formed by large instream roughness elements or jutting rocks which churn the flow into surges, boils, eddies, and vortices thus eliminating any good resting areas for migrating fish (Figure 6). Excessively turbulent flows (i.e., white water) with high velocities make it difficult for fish to orientate themselves and make full use of their swimming power. The turbulence created from the falling water at the Quarry boulder cascade impacts the shallow jump pool and drastically impairs steelhead jumping ability. Thus, a relatively low stream elevation drop (i.e., fall) may act as a total barrier to upstream steelhead migration if there is insufficient depth in the jump pool which impairs a fish's propulsive power. The turbulent boulder cascade barrier type assessed at the north end of the Quarry reach presents

the greatest difficulty for fish passage due in large part to the lack of resting areas (i.e., depth) due to excessive turbulence and velocity (Orsborn and Powers 1985).

Alteration to the River Channel

Evidence obtained from inspection of the North Fork adjacent to the Quarry indicate that the characteristics and condition of the constricted river channel within the Quarry reach are the result of improper land-use activities, namely the artificial importation of inorganic debris. The placement of fill material on the Quarry slopes has occurred at two discrete portions of the 0.30-mile long Quarry reach. Specifically, the channel width at the northern border of the Quarry reach has been reduced by the placement of inorganic material on the east bank that appears to be sloughing into the channel. Riprap fill (i.e., 2-3 ton boulder) has been haphazardly placed on the steep slope at the location of the 2006 landslide. Although the slope has been armored by rock, it remains unstable due to the manner in which the rock was placed on the steep slope and the lack of proper bank stabilization (i.e., creation of a foundation) prior to the bank armoring. NMFS biologists documented the angular Quarry boulders placed on the landslide slope at the edge of the Quarry road upslope of the North Fork channel, which extended the entire way down the embankment to the edge of the North Fork and into the channel (Figure 7). Evidence suggests that the angular boulders creating the turbulent boulder cascade barrier were stray boulders that potentially originated from this unauthorized bank armoring. Photographs clearly show that unauthorized riprap fill has been placed on the east bank of the North Fork sometime between January 2008 and January 2010 (Figures 8 & 9).

The second area of the Quarry where the placement of rock fill has occurred on the North Fork streambank is at the southern border of the Quarry reach. This bank-stabilization work is documented in a letter from the Quarry operator dated January 21, 2009, and was sent to the Corps. Approximately 1890-tons of 6" to 24" rock riprap was placed on the east bank to armor 8500-square feet of the North Fork embankment. No dates are provided in the letter describing the timing that the work was conducted, but the Quarry operator states that CDFG was contacted prior to starting the bank stabilization and that the work was conducted during the rainy season for approximately two weeks. According to CDFG (N. Lohmus pers. comm., July 6, 2010), she did not authorize this work, nor was she contacted by the Quarry operator before or after the work was completed. The photographs enclosed with the letter illustrate that the 4-foot thick riprap rock protection appears to extend within the ordinary high water mark delineation. Of particular note is the lack of mature riparian trees and the localized simplification of the riparian vegetation in this disturbed area.

Extensive areas of exposed soil

The creation of fish-passage barriers are problematic for smolt emigration and adult immigration, but the introduction of fine sediments to the North Fork are problematic to all stages of the steelhead life history. Developing embryos need clean cobble and gravel for incubation, parr require healthy aquatic invertebrate communities that occupy silt-free substrates for food, and smolt and adult migration are impaired by runoff with high sediment loads. The steep, unvegetated slopes on the Quarry property create an elevated sedimentation risk. The existing Quarry is reported to consist of 4 to 9-acres of bare exposed rock and fill dirt, and Quarry slopes have been identified as unstable and subject to rockslides (EDAW 1993). Topography of the Quarry area is extreme, consisting of steep walled canyons. The NMFS inspection of the Quarry property noted that the accumulations of exposed fine sediment were extensive throughout the property. The north sediment-detention basin

was installed as a measure to prevent Quarry sediment that washes off bare slopes and quarry roads during rain events from entering the North Fork. Based on NMFS' site visit observations, the frequency that the fine sediment is removed from the basin is not clear. Due to the 1) small size of this basin, 2) lack of drainage features, 3) large amount of loose upslope Quarry material, and 4) close proximity to the adjacent unstable landslide slope, it is reasonable to expect that this basin can fill, frequently, with Quarry material and be rendered ineffective, and the narrow earthen dam on the unstable slope face can fail and cause another landslide at this site (Figure 10). In response to NMFS' questions regarding the frequency that sediment needs to be removed from the south sediment detention basin, the quarry operator stated that the fines need to be removed from that basin on a regular basis. At the time of NMFS' April 15, 2010, site visit, the south sediment-detention basin had accumulated a high level of fine sediment in response to a moderate 1.76-inch rain event on April 12, 2010 (Matilija Dam Station #304). It does not appear that the south sediment basin, as constructed, can effectively capture and retain a sufficient amount of the quarry sediment runoff, particularly during moderate to large storm events (Figure 11). Furthermore, the basin spillway does not appear to function effectively. Evidence suggests that water-sediment slurry flows freely from the basin to the creek during storm events as suggested by the swath of unvegetated gravel and fine sediment that is visible leading away from the basin spillway to an erosion channel beneath the SR-33 bridge (Figure 11). Aerial photographs of the Quarry property demonstrate the loss of vegetative land cover and the extensive areas of exposed soil that are burdening the two small sediment detention basins during storm runoff (Figures 12 & 13).

Alteration of streamside vegetation

NMFS' inspection of the Quarry reach found that the placement of rock riprap appears to be precluding the establishment of streamside vegetation (Figure 7). Extensive areas of rock riprap placed streamside were observed and such areas lacked streamside vegetation. By contrast, streamside areas immediately upstream and downstream of the rock riprap possessed trees and bushes. Precluding streamside vegetation is of concern owing to the function and value such vegetation provides to streamfish in general and steelhead in particular.

VI. Summary of Findings

The findings indicate that a portion of the North Fork channel has been modified, and extensive areas of exposed fine sediment are contributing to increased sedimentation during storm events. The findings of the NMFS inspection are consistent with those of other investigators who conducted similar investigations of the Quarry reach during the same time period when the observations reported here were noted (e.g., SBCK 2008). The findings are not surprising because improper land-use activities can cause a host of impacts to the environment, including exposed soil, alterations of streams and vegetation, and loss of important habitats for species, as reported in the scientific literature (e.g., Hicks et al. 1991, Quist et al. 2003). Of particular concern are the effects of the habitat alteration and exposed soil on endangered steelhead.

The measures taken to date by the Ojai Mosler Quarry have been ineffective at preventing the creation of fish passage barriers and sediment inputs into the North Fork. The method of simply removing a barrier without properly stabilizing the landslide-prone slope is only a short-term approach to the prevention of fish passage barriers reoccurring along the steep Quarry slopes. Owing to the overlap in seasonality of rockfalls and the steelhead spawning migration (i.e., winter-spring rainy season), a winter rockfall introduces the high likelihood of precluding any steelhead

from spawning in the five miles of habitat upstream since the instream work to remove the boulders cannot occur until the summer dry season (per CDFG 2006).

Given the reoccurring nature of the Quarry materials sliding into the North Fork from the east bank, the importance of the affected area to endangered steelhead, and slope characteristics and drainage of the action area, NMFS believes that Quarry operations need to be modified to prevent the likelihood of appreciably reducing or altering the functional value of the aquatic environment and detrimentally impacting the endangered southern California steelhead Distinct Population Segment.

VII. Recommendations

NMFS recommends the following measures to alleviate the steelhead passage problem in the North Fork, which appear related to the Ojai Quarry operations. Therefore, NMFS recommends the removal of a minimum of five boulders that are the immediate cause of the problem. A cursory description of the boulders recommended for removal are as follows: Boulder # 1) large mid-channel rock creating barrier, 2) angular rock at base of falls minimizing the leaping area, and 3-5) three large rocks at base of the turbulent boulder cascade barrier, which is currently minimizing the holding area for fish attempting to pass upstream of the structure. NMFS is willing to provide more in depth planning guidance and recommends having a NMFS biologist/hydrologist onsite to provide technical assistance during the removal of the barrier.

While the boulder removal recommendations provide a temporary solution for the current problem, they do not alone provide a permanent solution to the rockfalls that repeatedly have occurred along the Quarry property. In light of the fact that the rockfalls have been a reoccurring problem at the north end of the Quarry property, NMFS recommends that streambank stabilization methods, incorporating traditional and bioengineering techniques, be applied (Table 1). The current use of cement highway barriers are woefully ineffective at providing the necessary type and level of stabilization, and no measure is in place to prevent the continued slide of boulders and Quarry rock into the North Fork at the site of the current fish passage barrier. Because all streambank-stabilization activities and placement of fill within the banks of the stream need to be permitted by the Corps of Engineers and CDFG, and there is no record of a state or federal permit on file with these agencies that authorizes the installation of riprap bank stabilization, it appears these quarry boulders were cast down the unstable slope without the proper regulatory guidance or authorization. As illustrated in the background section of this memorandum, this letter marks the fifth time in the past five years that boulder removal has been recommended at this site to restore endangered steelhead passage. Previous recommendations to remove quarry rock from the North Fork were made by NMFS, CDFG and the Corps on April 19, 2006, August 2, 2006, March 6, 2007, February 20, 2008, and December 10, 2008. NMFS recommends that the loose boulder material be removed from this unstable slope and that Quarry hire a licensed contractor to properly stabilize this erodible slope.

The CDFG Agreement authorized the removal of rocks and boulders tagged with orange spray paint by CDFG and NMFS staff during the March 6, 2007, site visit. The Agreement provides provisions that specifically limit what activities are authorized. Provision #24 states that any materials placed in seasonally dry portions of a stream that could be washed downstream or could be deleterious to aquatic life shall be removed from the project site prior to inundation by high flows. Provision #25 indicates that areas of disturbed soils with slopes toward a stream

shall be stabilized (using approved bioengineering methods) to reduce erosion potential, and that any installation of non-erodible materials not described in the original project description (i.e., riprap) shall be coordinated with CDFG. Provision #37 requires that rock, gravel, and/or other materials shall not be imported to, taken from or moved within the bed or banks of the stream, except as otherwise addressed in this Agreement. CDFG did not negotiate any additional Agreement provisions for bank stabilization on the Quarry property (N. Lohmus, pers. comm., May 18, 2010). As follow-up provisions of the Agreement, the Quarry operator was required to submit a Revegetation/Mitigation plan for CDFG review within 90 days of Agreement issuance. To date, CDFG has not received a revegetation or mitigation plan from the Quarry operator (N. Lohmus, pers. comm., May 18, 2010), therefore, this document is outstanding and is required for the Quarry to be in compliance with the terms and conditions on the Agreement. NMFS requests a copy of the Revegetation/Mitigation plan.

We recommend that the Quarry implement a revegetation plan to NMFS and CDFG in order to rehabilitate the barren landscape and redesign both sediment basins to adequately capture all Quarry property sediment runoff. NMFS believes a crucial step in the control of sediment runoff from the Quarry will rely on the Quarry developing a sediment-maintenance plan that mandates removal of the sediment from both detention basins after each rain event to maintain adequate sediment-capture capacity, as well as requires proper storage of the collected sediment that is removed from the detention basins. In its current configuration, the Quarry does not have an adequate fine sediment storage containment area that prevents sequestered sediment from making its way back into the sediment-detention basin slurry and potentially entering the North Fork (Figure 14). NMFS recommends that the Quarry seek outside assistance from experts in the field of stormwater management (i.e., RWQCB) to redesign the sediment detention basins in order to minimize sedimentation concerns from the Quarry property. The California Stormwater BMP Handbook (2003) provides guidance on recommended designs for this type of sediment detention structures.

VIII. Literature Cited

Bell, M. C. 1973. Fisheries Handbook of Engineering Requirements and Biological Criteria. Fisheries Engineering Research Program. U. S. Army Engineering Division. Oregon.

CDFG. 2006. Streambed Alteration Agreement for Notification Number: 1600-2006-0107-R5. Issued by Natasha Lohmus to Larry Mosler, Mosler Rock Ojai Quarry. August 2, 2006. 9pp.

California Stormwater BMP Handbook. 2003. Extended Detention Basin Design Considerations. Errata 5-06 New Development and Redevelopment. Available at: www.cabmphandbook.com. January 2003. 10pp.

Corps. 2006. Memorandum from John Markham to Larry Mosler Re: Mosler (Ojai) Rock Quarry Slide Remediation, N. Fork Matilija Creek. Corps file no. 200601060-JWM. April 25, 2006.

Edaw Inc. 1993. Draft Environmental Impact Report Schmidt Rock Quarry CUP – 3489 (MOD 2). State Clearinghouse Number: 89032904. Prepared for the County of Ventura. March 19, 1993.

Evans, W.A. and B. Johnston. 1980. Fish migration and fish passage. USDA Forest Service, EM-7100-12. Washinqton, D.C. 63 pp.

Hicks, B.J., J.D. Hall, P.A. Bisson, and J.R. Sedell. 1991. Response of salmonids to habitat changes. American Fisheries Society Special Publication 19: 483-518.

Lohmus, Natasha. Personal communication. Email sent from Natasha Lohmus of CDFG, Re: Ojai Rock Quarry Permitting. May 18, 2010.

Lohmus, Natasha. Personal communication. Telephone conversation with Natasha Lohmus of CDFG, Re: Ojai Rock Quarry letter dated January 21, 2009. July 6, 2010.

NMFS. 2001. Guidelines for Salmonid Passage at Stream Crossings. National Marine Fisheries Service, Hydraulic Engineering Staff, Southwest Region. September 2001. 14pp.

Powers, P.D. and J.F. Orsborn. 1985. Analysis of barriers to upstream fish migration – an investigation of the physical and biological conditions affecting fish passage success at culverts and waterfalls. Final Project Report Part 4 of 4. Report to Bonneville power Administration (BPA Report DOE/BP-36523-1). Albrook Hydraulics Laboratory, Washington State University, Pullman, WA. 134pp.

Quist, M.C., P.A. Fay, C.S. Guy, A.K. Knapp, and B.N. Rubenstein. 2003. Military training effects on terrestrial and aquatic communities on a grassland military installation. Ecological Applications 13: 432-442.

Santa Barbara Chanelkeeper. 2008. Letter Re: Ongoing Clean Water Act and Endangered Species Act Violations at Mosler Rock Ojai Quarry. March 26, 2008. 6pp.

Figure 1. North Fork Matilija Creek watershed showing river mileage (RM) from the Matilija Creek confluence. Current steelhead passage indicated by stream color. Green = accessible, Blue = accessible with removal of Quarry barrier, Red = inaccessible. The "Quarry reach" (light shaded area) is the North Fork channel area between the Ojai Quarry Boulder Barrier and the Quarry entrance.

Figure 2. Boulder fish barrier in the North Fork Matilija Creek at site of the 2006 landslide at north end of Ojai Quarry property. Photo taken March 06, 2007, by NOAA Law Enforcement.

Figure 3. North sediment detention basin, immediately upslope of the 2006 landslide (figures 3 & 4) and current North Fork fish passage barrier. Photo taken March 7, 2010, by NMFS.

Figure 4. South sediment detention basin at Highway 33 and the Quarry driveway. Note fine sediment overflow from basin low point (i.e., spillway). Photo taken April 15, 2010, by NMFS.

Figure 5. Measuring the jump height and jump pool depth of current turbulent boulder cascade barrier in the North Fork at base of 2006 landslide area. Photo taken April 15, 2010, by NMFS.

Figure 6. Turbulent boulder cascade barrier in the North Fork, located at the north end of the Quarry reach where boulders were once removed. Photo taken January 24, 2010, by NMFS.

Figure 7. Unstable landslide slope at north end of Quarry reach. Current steelhead barrier exists in whitewater area at base of riprap bank stabilization. Photo taken April 15, 2010, by NMFS.

Figure 8. Quarry landslide area on January 7, 2008, note the lack of boulder riprap fill on left half of slope (Source: Santa Barbara Channelkeeper letter dated March 24, 2008).

Figure 9. Same Quarry landslide area as above, except red polygon shows boulder riprap fill placement in the floodplain and up the Quarry slope. Photo taken January 24, 2010, by NMFS.

Figure 10. Landslide area below north sediment detention basin during rain event on December 18, 2007 (Source: Santa Barbara Channelkeeper letter dated March 24, 2008).

Figure 11. Zoom view of the south sediment detention basin. Note high sediment load in basin that accumulated after April 12, 2010, 1.76" rain event. Photo taken April 15, 2010, by NMFS.

Figure 12. Aerial photograph (2005) of the north end of the Quarry reach. Green dot references the site of the current steelhead boulder barrier.

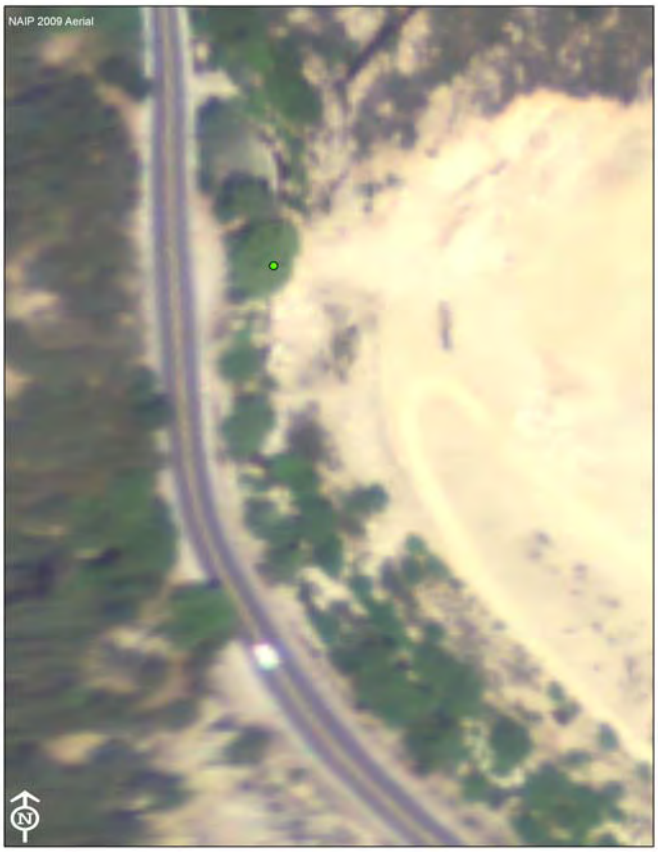

Figure 13. Aerial photograph (2009) of the north end of the Quarry reach. Green dot references the site of the current steelhead boulder barrier.

Figure 14. Location where detention basin sediment is deposited and allowed to air-dry. Note lack of adequate retaining structures to prevent runoff. Photo taken April 15, 2010, by NMFS.

Table 1. Stream bank stabilization and Bio-engineering resources.

	Document	Agency / Author	Source	Notes
1	CA Salmonid Stream Habitat Restoration Manual	CA Department of Fish & Game	http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp	**Part X**. Flow diversion (p.82). **Part XI.** Restoration of Native Riparian Habitats.
2	Stream Restoration Design Handbook	Federal Interagency Stream Restoration Working Group	http://www.nrcs.usda.gov/technical/stream_restoration/	**CH 15.** Maintenance & monitoring.
3	Stream Corridor Restoration: Principles, Processes & Practices	Federal Interagency Stream Restoration Working Group	http://www.nrcs.usda.gov/technical/stream_restoration/	**CH 8F**. Stream bank restoration. **CH 9**. Restoration Implementation.
4	Stream Restoration: A Natural Channel Design handbook	North Carolina State University / North Carolina Sea Grant	http://www.bae.ncsu.edu/programs/extension/wqg/sri/stream_rest_guidebook/guidebook.html	**CH 9.** Riparian buffer re-establishment.
5	Engineering With Nature	Federal Emergency Management Agency	Contact: Mark Eberlein FEMA Region X Environmental Officer 130-228th Street SW Bothell, WA 98021 mailto:(mark.eberlein@dhs.gov)	**Pg 8.** Problems associated with Riprap. **Pg 11**. Adding river roughness.
6	Riparian Land Recovery Initiative	Bureau of Land Management	http://www-a.blm.gov/riparian/index.htm	Riparian corridor info.
7	Stream and River Protection for the Regulator and Program Manager: A Technical Circular	California State Water Resources Control Board	http://www.swrcb.ca.ogv/	**CH 4**. Erosion problems. **CH 5**. Stabilizing stream channels.
9	The Practical Streambank Bioengineering Guide: a User's Guide for Natural Streambank Stabilization Techniques	U.S. Department of Agriculture / National Resources Conservation Service	http://plant-materials.nrcs.usda.gov/pubs/idpmcpustguid.pdf	**CH 3.** Stream bank bioengineering. **CH 4**. Vegetation Selection and Procurement
10	Bioengineering Guidelines for Streambank Erosion Control. Environmental Impact Research Program Technical Report EL-97-8.	U.S. Army Corp of Engineers	http://el.erdc.usace.army.mil/elpubs/pdf/trel97-8.pdf	**CH 2.** Bioengineering design model.
11	Streambank Stabilization Using Traditional and Bioengineering Methods: A Literature review	University of Nebraska	http://www.nlc.state.ne.us/epubs/R6000/B016.0131-2007.pdf	**CH 4-3**. Impacts of vegetation on slope stability