Report of Waste Discharge

Stitz Creek Watershed

Humboldt County, CA

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Submitted by:

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1.0 Introduction

This report comprises an Application/Report of Waste Discharge for sediment discharges and temperature effects from timber harvesting activity conducted by Humboldt Redwood Company, LLC, in the Stitz Creek watershed, tributary to the Eel River, Humboldt County.

California Water Code section 13260 requires that persons discharging or proposing to discharge waste that could affect the quality of waters of the State shall file a Report of Waste Discharge (ROWD).

Most forestry and silvicultural operations conducted pursuant to an approved Timber Harvesting Plan in the North Coast Region are permitted through either the General Waste Discharge Requirement or Categorical Waiver of Waste Discharge Requirements. However, to address previously identified adverse cumulative impacts to water quality as a result of past timber harvesting operations in the Stitz Creek watershed, the NCRWQCB Executive Officer has requested individual Watershed-wide Waste Discharge Requirements (WWDR) be developed as the permitting framework under which future timber operations be conducted[1]. In response to this request, Humboldt Redwood Company, LLC (HRC) is submitting this ROWD to assist in the establishment of WWDRs which will provide for restoration of beneficial uses and continued forest management in the Stitz Creek Watershed.

The report provides information regarding past, current, and planned future forestry activities, and identifies specific measures and actions to be implemented for the protection and restoration of water quality (sediment and temperature) as part of anticipated Watershed-Wide Waste Discharge Requirements (WWDRs).

1.1 Site Description

1.1.1 Site Location

Stitz Creek is a tributary to the Eel River, which drains to the Pacific Ocean. The Stitz Creek watershed is located in coastal northern California approximately 3.5 river miles upstream of the town of Scotia in Humboldt County (Figure 1-1). Stitz Creek's legal description at the confluence with Eel River is Township 1N Range 1E Section 22 (lower Eel HUC 18010105).

[1] California Regional Water Quality Control Board North Coast Region letter from Robert Klamt, Interim Executive Officer, to Dr. Jeff Barrett and Mr. Mike Miles, The Pacific Lumber Company (predecessor to Humboldt Redwood Company), dated February 27, 2008.

1.1.2 Facility Defined

The Stitz Creek Watershed encompasses approximately 2,572 acres (4 mi^2), of which HRC owns approximately 100%. The "Facility" covered by this WDR application includes only those lands owned and managed by HRC and rights-of-ways over roads on lands owned by others (Figure 1-2).

The 'Facility' is managed by HRC for growing conifer trees for the production of saw logs and other renewable forest products.

1.1.3 Topography

The topography for the site is provided in hill-shade form displayed on Figure 1-2. As the map illustrates, Stitz Creek has a dendritic drainage pattern deeply incised into steep hillslopes. Elevations range from close to 1700 feet on the ridge defining the southern hydrologic divide to about 70 feet above sea level at the confluence with the Eel River. Ridge-top areas can be fairly gentle but slopes quickly become steep within the interior of the basin.

1.1.4 Climate

Rainfall data collected at nearby Scotia, CA, indicates an average annual rainfall of 48.7 inches[2]. The majority of precipitation falls in the form of rain, with snowfall a rare event. The rainfall pattern is Mediterranean, with the majority of annual average rainfall occurring during the months of October through April. The storm seasons in hydrologic years 2003 and 2006 were the first significant precipitation events since the implementation of the HCP.

A more detailed characterization of the climate can be found in the Appendix A report titled *Landslide Inventory for the 2003, 2006, and 2010 Storm Seasons, Stitz Creek, Humboldt County, California* (pages 5-9).

1.1.5 Geology

Sediments within the Stitz Creek drainage derive primarily from the Miocene to Pleistocene aged Wildcat Group. The Wildcat Group consists of five distinct lithologies representing a marine regression indicated by the coarsening-up stratigraphic sequence. The lithologies, from oldest to youngest, are the Pullen, Eel River, Rio Dell, Scotia Bluffs, and Carlotta Formations. Undifferentiated Wildcat Group is also present in Stitz Creek. Undifferentiated Wildcat is more or less homogeneous in texture and fabric and lacks distinctive bedding or indicator fossils present in the other formations. Undifferentiated Wildcat is commonly characterized as poorly indurated sandy siltstone. A relatively small portion of the drainage is underlain by the Yager terrane, characterized as marine argillite, sandstone, and conglomerate dating to the Paleocene to late Eocene.

[2] California Date Exchange Center (http://cdec.water.ca.gov/cgi-progs/profile?s=SCA&type=precip)

A more detailed characterization of the Stitz Creek geologic setting can be found in the Appendix A report titled *Landslide Inventory for the 2003 and 2006 Storm Seasons, Stitz Creek, Humboldt County, California* (pages 2-5).

2.0 Site Use and Regulation

Land use within the watershed is consistent with timber production zoning (TPZ) and is predominantly devoted to timber production. Near the southernmost tip of the watershed a County road (Shively Road) crosses Stitz Creek near its confluence with the Eel River.

2.1.1 Regulatory Agencies and Permitting Requirements

Agencies with regulatory oversight of timber harvest and related activities in the watershed are as follows:

- North Coast Regional Water Quality Control Board
- California Department of Forestry and Fire Protection (Cal-Fire)
- California Department of Fish and Wildlife
- California Geological Survey
- North Coast Air Quality Management District
- County Agriculture Commissioner
- U.S. Fish and Wildlife Service
- NOAA Fisheries
- Humboldt County Public Works
    - Owns and maintains the Shively Road right-of-way approximately 1,500 feet upstream from the mouth.

2.1.2 CEQA Requirements

Adoption of watershed-wide waste discharge requirements by the NCRWQCB will require compliance with the California Environmental Quality Act (CEQA).

2.1.3 Timber Harvesting Permitting

The CEQA Lead Agency for timber harvesting operations is the California Department of Forestry and Fire Protection (CAL-FIRE). The Secretary of Resources has certified that regulation of timber harvesting operations by CAL-FIRE is exempt from CEQA's requirements to prepare an Environmental Impact Report (EIR) or Negative Declaration. A Timber Harvesting Plan (THP) that is approved by CAL-FIRE is considered a Functional Equivalent of an EIR under CEQA.

NCRWQCB staff review Timber Harvesting Plans as a formal 'Review Team' member, participate in pre-harvest inspections, and submit comments and recommendations to CAL-FIRE to address concerns over potential adverse effects to water quality.

2.1.4 Habitat Conservation Plan

All of HRC ownership in the Stitz Creek watershed is covered by a multi-species state and federal Habitat Conservation Plan (HCP) approved in 1999. The HCP Aquatic Conservation Plan for aquatic species including Chinook salmon, Coho salmon, cutthroat trout, steelhead trout, southern torrent salamander, tailed-frog, red-legged frog, foothill-yellow legged frog, and the northwestern pond turtle are most relevant to protection of the Beneficial Uses of Stitz Creek. The management measures for water quality protection of the HCP were the subject of the federal Environmental Impact Statement and state Environmental Impact Report which led to the issuance of the HCP in conformance with the state and federal Endangered Species Acts.

2.1.5 Waste Discharge Requirements

California Water Code section 13260 requires that persons discharging or proposing to discharge waste that could affect the quality of waters of the State shall file a Report of Waste Discharge (ROWD). The ROWD is the start of the application process for Waste Discharge Requirements (WDRs).

Watershed-wide WDRs are being required and sought in an effort to ensure the mandate of the NCRWQCB is fulfilled while timber harvesting proceeds in the watershed.

2.1.6 Stream Alteration Permits

Any activity proposed by HRC that may alter the streambed or bank of any stream must first be issued a permit by the California Department of Fish and Wildlife (DFW) 1600 process. Such activities include new or reconstructed stream crossings, stream restoration or water drafting. These permits are subject to CEQA requirements and analysis prior to issuance by DFW.

2.1.7 Beneficial Uses

The North Coast Basin Plan lists the Beneficial Uses of Water Quality for Stitz Creek as:

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Industrial Service Supply (IND)
- Industrial Process Supply (PRO, potential)
- Groundwater Recharge (GWR)
- Freshwater Replenishment (FRSH)

- Navigation (NAV)
- Power Generation (POW, potential)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Commercial and Sport Fishing (COMM)
- Cold Freshwater Habitat (COLD)
- Wildlife Habitat (WILD)
- Rare, Threatened and Endangered Species (RARE)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction and/or Early Development (SPAWN)
- Aquaculture (AQUA, potential)

While the extent to which these beneficial uses actually apply to Stitz Creek varies with respect to the list above, the most obvious beneficial use is by residential cutthroat and rainbow trout upstream of the Shively Road crossing. This crossing was originally constructed by Humboldt County Public Works in the mid 1950's. The existing culvert was reconstructed in 1965. Currently, there is an eleven foot vertical drop from the culvert outlet plunging to the creek bed. This plunge is considered a barrier to anadromous salmonids including coho, Chinook, and steelhead. Approximately 2.8 miles of fish-bearing stream habitat can be found in the watershed.

Like most of the rivers on the Northern Coast of California, Stitz Creek is currently included on the 303d list of impaired water bodies for sediment/siltation and temperature, listed under that of the Eel River Delta, Eel River HU, Lower Eel HA; California watershed i.d. 11111032. The United States Environmental Protection Agency (EPA) established Total Maximum Daily Loads (TMDLs) for sediment and temperature in the Lower Eel River in 2007.

3.0 Site History

3.1.1 Past Land Management Activities

Timber Harvest and Road Construction History

Old-growth redwood and Douglas-fir timber harvesting in the Stitz Creek watershed began in the early 1900s. Initial logging utilized steam donkeys coupled with a railroad built up the main channel of Stitz Creek. Stitz Creek was not re-entered until the mid-1970s.

In the early 1970's approximately one mile of road was constructed from Shively Road at the southern extent of the drainage. The first significant harvest re-entry occurred in 1974 on 185 acres in the northern portion of the watershed. Between 1974 and 1997 approximately 19 miles of road were constructed and approximately 73 percent of the watershed had been re-entered for timber operations. Harvest was conducted under a variety of silviculture methods including clearcut, seedtree removal, and shelterwood removal. Implementation of the HCP in 1999 greatly changed the logging and road construction practices on the ownership. After 1999 less than one mile of road was built and since that time, 270 acres (10% of HRC ownership in the watershed) have been harvested. This most recent period of harvest was conducted under a variety of silviculture methods including clearcut, selection, and shelterwood removal. No significant harvesting has taken place in the Watershed since 2008. Approximately 27 acres of selection harvest was logged in 2013 (THP 1-07-161HUM) under a waiver agreement with NCRWQCB.

A focused effort to improve the entire road system began in 1997 with a sediment source assessment of active and potential road-related sediment sources conducted by Natural Resource Management Corporation (NRM). A new inventory was conducted by R&J Miller Consulting in 2012. This inventory identified 42 sites along the road system recommended for 'treatment'. Of these, 6 sites have already contributed or have potential to contribute approximately 168 yds[3] of sediment and are scheduled for treatment. Since 1999, an estimated 10.4 miles of road has been storm-proofed within the watershed and 9 sediment saving sites have been treated for an estimated savings of 1,016 cubic yards of sediment.

Figures 3-1 and 3-2 summarize harvest and road construction history.

An additional account of the Stitz Creek land use history can be found in the Appendix B report titled *Sediment Source Investigation and Sediment Reduction Plan for the Stitz Creek Watershed, Humboldt County, California; Natural Resources Management, 1998* (pages 5-6).

4.0 Existing Sediment Sources

This section explains the methods by which HRC maintains an inventory, and prioritizes treatment of controllable sediment discharge sources[3] (CSDS) in the Stitz Creek watershed.

[3] "Controllable sediment discharge source" means sites or locations, both existing and those created by proposed timber harvest activities, within the Project area that meet all the following conditions:

1. Is discharging or has the potential to discharge sediment to waters of the state in violation of applicable water quality requirements,
2. was caused or affected by human activity, and
3. may feasibly and reasonably respond to prevention and minimization management measures.

Current inventories and treatment schedules are included as Appendices A and C. These sediment discharge sources are linked primarily to landslides and roads, including a combination thereof. Contemporary sediment delivery from surface erosion caused by logging-related ground disturbance (i.e. skid roads, cable-yarding corridors, and site preparation activities including broadcast burning) is minimal due to HCP and FPR mitigation measures (see Section 6.0) and the curtailment of recent logging activities.

4.1 Landslides

4.1.1 Methods for Maintaining Complete and Current Inventory of Landslide-related Sediment Sources

HRC maintains a complete and current inventory of landslide-related sediment sources through periodic aerial photograph assessment, helicopter fly-overs, and on-ground reporting. The purpose of these assessments is to locate and characterize new or re-activated landslides which deliver sediment to streams and determine if sediment delivery mitigation options exist (i.e. bio-remediation, drainage alteration, armoring, excavation, etc.).

The most recent watershed-wide comprehensive landslide inventory was conducted by a Professional Geologist in 2015 (Watkins 2015). This inventory used 2003, 2006, and 2010 aerial photographic interpretation to identify and characterize all new and/or active landslides in the Stitz Creek watershed. Methods used during this landslide inventory are described in the report (Appendix A). Future inventories of this nature will be conducted using similar methodologies consistent with guidelines presented in California Geological Survey Note 52, Guidelines for Preparing Geologic Reports for Regional-Scale Environmental and Resource Management Planning (2001), and will occur at no more than 5 year intervals or be determined in part by the occurrence of triggering events such as large earthquakes or storms as well as the availability of aerial photographs.

HRC will also conduct a watershed-wide reconnaissance level investigation for mass wasting events utilizing established protocols (SOP-08) following triggering events in or near the Stitz Creek watershed, defined as (1) greater than 3 inches of rainfall within 24 hours as measured at Scotia; (2) a significant earthquake. Determining if an earthquake is a "triggering event" is based upon earthquake magnitude and distance of epicenter from the watershed referencing Figure 2, Graph A of Keefer (1984).

On-ground reporting consists of HRC staff (i.e. Forestry and Forest Sciences) contacting the HRC Geology Department in the event a new or recently active landslide is observed during the course of daily duties (i.e. road inspections, wildlife surveys, aquatics monitoring, THP layout and logging supervision).

4.1.2 Current Inventory, Prioritization Strategy, and Source Remediation Schedule

The current inventory of landslide-related sediment sources can be found in Appendix A (Watkins 2015). This investigation mapped and analyzed landslide activity in the Stitz Creek drainage following the 2003, 2006, and 2010 storm seasons. Aerial photographs were used to make estimates of sediment production and delivery to watercourses for each storm event, and landslide attributes were analyzed to quantify associations with geomorphic and management criteria. The 2003 and 2006 storm seasons were significant when compared with historical precipitation data, set several records for seasonal and monthly totals, and are considered landslide-triggering events because of the widespread landsliding experienced across the region.

In brief summary, the Stitz Creek Landslide Inventory mapped 166 landslides for the 2003 storm season, 10 for the 2006 season, and 1 for the 2010 season with a total of 177 individual landslides mapped. Of the 177 individual landslides 59% were determined to be reactivations of pre-existing failures. About 71%, 77%, and 88% of failures in the 2003, 2006, and 2010 seasons, respectively were determined not to be associated with roads. It appears that few landslides are connected to the modern road network rather with abandoned roads and disconnected skid trails. 21% were not associated with any reported harvest activity or in non-operational areas of THPs. Within the "Timing of Management-Related Failures" section of Appendix A, Watkins points out that the comparison between pre- and post-HCP landslides shows a significant reduction in the rate of landsliding after the implementation of the HCP. This is attributed to avoidance or mitigated operations on and adjacent unstable areas resulting in a significant improvement over the rate of failures associated with pre-HCP harvest operations.

Of the 166 landslides mapped for the 2003 season, 43% were determined to have delivered to a watercourse. An estimated 82,944 yds^3 of sediment was displaced during the 2003 storm season with an estimated 17,591 yds^3 of sediment delivered to watercourses. During the 2006 storm season, 54% of the landslides delivered to a watercourse and of the estimated 33,502 yds^3 of sediment displaced an estimated 10,662 yds^3 delivered to watercourses. It was determined that 50% of the landslides delivered during the 2010 season with 6,395 yds^3 displaced and 5,083 yds^3 delivered.

Historic pre-HCP harvest practices (large acreage/low retention silviculture and excessive road/skid trail construction) combined with poorly consolidated bedrock and precipitation-driven triggering events are identified as the leading association between timber management activities and landslide occurrence. HRC is committed to the mandates for minimizing sediment delivery set forth in the California Forest Practice Rules and the HCP. The Erosion Control Plan (ECP) implemented under the General Waste Discharge Requirements can also be implemented under the WDR. Potential erosion control measures may include, but are not limited to: re-vegetation (e.g. tree planting, seeding, willow waddles), excavation, drainage modification, and buttressing or armoring of unstable areas.

Further history of landsliding in the Stitz Creek drainage includes an inventory dating back to 1947 aerial photographs and can be found in the Appendix B report titled *Stitz Creek Sediment Source Assessment and Sediment Reduction Recomendations,* prepared by Natural Resources Management Corporation *(1998)*.

4.2 Roads

4.2.1 Methods for Maintaining Complete and Current Inventory of Road-Related Sediment Sources

HRC maintains a complete and current road-related sediment source inventory for roads under its control. In the Stitz Creek watershed, this inventory was initiated with a 2012 complete road inventory conducted within the Stitz Creek watershed.

Road inventories of active or potential sediment sources are kept current through implementation of an **Annual Road Inspection Program (ARIP)** (HCP 6.3.3.5.1). This program requires all roads to be inspected at least once annually between May 1 and October 15 to ensure that drainage structures and facilities are intact and fully functional, and to identify any active or imminent road-related failures of the road prism, cutbanks, or fills which may have occurred during the previous winter and can deliver sediment to streams (i.e. development of new sediment sources).

Additional road inspections throughout the year are not uncommon and include:

1. **Storm-triggered Road Inspections** (HCP 6.3.3.5.2) - All accessible roads are inspected as soon as conditions permit following any storm event that generates 3 inches or more of precipitation in a 24-hour period, as measured at the Scotia rain gauge. The most recent road inspection triggered storm event occurred in March of 2012. The entire maintained road system across the property is currently being inspected. Road maintenance sites that are discovered will be added to the database and schedule for repair.
2. **Timber Harvest Plan** development - Roads appurtenant to planned timber harvest operations are reviewed during individual Timber Harvest Plan (THP) development to determine if roadwork is required to achieve or maintain an 'upgraded' or 'storm-proofed' standard (HCP 6.3.3.9).
3. **THP Erosion Control Plans (ECP)** - Require three annual inspections of the THP project area including appurtenant roads and harvest units where timber operations are or have been active during the life of the ECP. Discharges in potential violation of the Basin Plan are reported to the NCRWQCB upon discovery.

Information regarding discovered maintenance sites, including new or developing sediment sources, is recorded in a centralized Roads Database. These records are maintained for scheduling of work and in some instances post-treatment monitoring (e.g. WDR ECP inspections). The database is updated with completion dates as individual sites are treated.

The HRC Roads Department is contacted immediately in instances where significant active delivery or preventive imminent failure is discovered so that control measures can be enacted as soon as environmental conditions permit.

Collectively, these measures provide routine inspection and maintenance of the road system and a current road-related sediment source database from which to prioritize, schedule, implement, and monitor road-related sediment source remediation.

4.2.2 Current Inventory, Prioritization Strategy, and Source Remediation Schedule

An inventory conducted in the fall of 2012 by R&J Miller Consulting identified 6 road-related sediment source sites. The 6 CSDS sites have already contributed or have potential to contribute approximately 168 cubic yards of sediment. The current inventory of all known road-related sediment sources and road maintenance work orders are included in Appendix C. HRC proposes assessing and repairing all 6 identified CSDS sites in the first 5 year period following establishment of the Stitz Creek WDR. All sites have been scheduled for repair following WDR approval. Refer to Figure 4-1 for location of identified road-related sediment source sites.

The road inspection by R&J Miller Consulting identified 36 repair/maintenance sites not associated with CSDS within the Stitz Creek watershed. These sites were not contributing sediment and the majority requires removal of over steepened fill slopes, road surface drainage improvements, and culvert maintenance or replacement. These sites require an approved MATO permit from DFW and a WDR from WQ before treatment can occur. These sites are scheduled for maintence as presented in Appendix C upon procurement of required permits.

Controllable sediment discharge sources identified by ARIP, Storm-triggered road inspections, or individual THP ECP inspections are typically scheduled and treated within one year of discovery during the drier months of the year (May – November).

Individual sites with potential for sediment delivery to watercourses are ranked as ‘high’, ‘moderate’, or ‘low’ based upon level of erosion activity and volume of potential delivery. With some exception, the prioritization for treatment/control of individual sediment sources is based on a ‘cluster’ approach evaluation, in which active or potential sediment sources on individual roads are looked at cumulatively in order to prioritize treatment. Road segments with the greatest potential for sediment delivery over the shortest period of time (highest cumulative ranking) are prioritized for treatment over road segments with less potential future sediment delivery. The exception is where identified individual sites pose a significant threat to human safety or water quality resources, in which instance these sites are moved up in priority regardless of the rest of the road condition in that vicinity.

Annual road work plans for HCP-covered lands are formulated in the first quarter of each year and available for NCRWQCB staff review by April 15th of each year.

Additional non-scheduled routine minor maintenance (i.e. shaping of road surface, cleaning of inboard ditches and culvert inlets, maintenance of energy dissipation/downspouts, and roadside brush maintenance) may occur as needed in response to road inspection results and management needs.

4.3 Streamside Sources

Since 1999, streamside harvest operations in the watershed have been substantially restricted by the landowner's HCP including no harvest equipment exclusion zones with varying distances from 100 to 170 feet or greater on each side of Class I and II streams. These measures have minimized riparian disturbance and limited potential for creation of streamside sediment sources (not already captured by road and landslide inventories). Modern practices including enforceable FPR erosion control standards and limitations on use of ground-based equipment on moderate to steep slopes also reduce the likeliness of sediment delivery to streams as a result of harvest operations.

Focused field inspections for surface erosion associated with past harvest activities have been conducted on HRC's ownership as part of the HCP Watershed Analysis program (Freshwater 2002, Van Duzen 2003, LEED 2004, Upper Eel and Elk/Salmon 2005, Bear River 2007, Yager/Lawrence 2009). These inspections have found localized rill and gully erosion to rarely deliver to watercourses due to the effectiveness of the HCP Riparian Management Zones (RMZs) and FPR erosion control measures. Rapid site re-vegetation following harvest was also observed as normal for the region and contributed to minimizing post harvest surface erosion as years following harvest increased.

5.0 Future Forestry Operations

Planned timber operations including harvest and road use, construction, and re-construction are described in this section. Planned watershed restoration activities are referenced in Sections 4.0 and 8.0.

Humboldt Redwood Company LLC applies the following general harvest guidelines across the ownership:

- Well stocked conifer stands will be managed with an uneven-aged silviculture (i.e. selection/group selection/transition), typically retaining between 1/3 to 2/3 of the pre-harvest basal area. HRC has discontinued the use of the clearcut silviculture and the harvest of large Old Growth trees across the ownership.

- Variable retention (VR) and rehabilitation silvicultural methods are used on HRC lands as an interim hardwood removal or stand improvement silviculture targeted specifically for forest restoration of understocked areas. Both of these silvicultures will be applied in a manner that retains 10 to 40 percent of the original stand post harvest, providing ecological structure while creating sufficient opportunity to plant and regenerate redwood and Douglas-fir species.
- Cable yarding is used on slopes greater than 40 percent, where feasible, including areas previously tractor yarded, to minimize or avoid unnecessary site disturbance, soil compaction, and associated increased potential for sediment delivery.
- Roads no longer required for harvesting (e.g. due to transition from tractor to cable yarding) or other forestry purposes (e.g. wildlife surveys, monitoring, etc.) are closed.

5.1 Timber Harvest

HRC anticipates harvesting approximately 30 percent (770 acres) of the total watershed area over the next decade (2019-2029) using primarily Selection and Group selection (<2.5 acre openings) silviculture (14CCR 913.2). Canopy conditions in selectively harvested areas will typically range from 40-60 percent immediately following harvest and will increase over time in response to open light conditions.

Variable Retention or Rehabilitation of Understocked Area silvicultural methods (14CCR 913.4) may be used for harvesting stands currently dominated by hardwood species but capable of growing conifer species. This hardwood component is often the result of earlier pre-Forest Practice Act logging operations when re-establishment of conifer regeneration following harvest was not required. Conifer stands which have been damaged by animals (typically referring to redwood stands with extensive impacts from bears feeding on the cambium layer), past timber operations, or previously high-graded may also use Variable Retention as a regeneration method to establish a new age class or to improve forest health and productivity. Where suitable (i.e. stable) slope conditions exist within the logging area, these harvest methods may remove up to 60-90 percent of the forest canopy (outside of riparian management zones) allowing for planting of redwood and/or Douglas-fir seedlings following logging operations. HRC anticipates harvesting up to 125 acres (Approximately 5% of watershed) over the next decade utilizing these two silvicultural methods.

Logging (yarding) methods will be selected based on suitability to terrain. In general, ground-based yarding operations will be constrained to slopes ≤ 40 percent. High-lead and full suspension cable yarding will typically be used on slopes >40 percent. Figure 5-1 illustrates these two general slope classes in the Stitz Creek drainage and infers where each yarding method will typically be used. Helicopter yarding will be used as necessary to access areas where topography and/or slope

stability prevents conventional yarding access (e.g. no existing road access; new road construction not advisable) or where topography otherwise prevents use of more conventional yarding means (e.g. blind leads, poor deflection, etc.).

Under current HCP prescriptions, no harvesting will occur adjacent to Class I and II watercourses or on unstable slopes leading to watercourses. Slope stability will be assessed by a licensed geologist using landslide inventory data, landslide hazard modeling, and California Geologic Survey standards for Engineering Geologic Reports for Timber Harvest Plans (CGS Note 45). ***See Section 6.0 for details regarding Sediment and Adverse Stream Temperature Prevention and Minimization Measures***.

Figure 5-2 shows the locations of potential THPs which are currently scheduled for harvest over the next ten years (2019-2029).

5.1.1 Road Condition, Use, and New Construction

As of today, approximately 12.1 miles of the road system is open and 6.7 miles have been closed/abandoned within the Stitz Creek watershed. Currently 10.4 miles have been constructed to HRC's HCP 'storm-proofed standard' (HCP 6.3.3.9). Storm-proofed roads are designed, constructed, and maintained to minimize the delivery of fine sediment from roads and drainage facilities to streams, as well as to minimize, to the extent feasible, sediment discharge resulting from large magnitude, infrequent storms and floods.

There are currently approximately 8.4 miles of non-storm-proofed roads in the watershed. Of these non-storm-proofed miles approximately 5.3 miles have been classified as closed/abandoned and are currently inaccessible and unfeasible to treat due to mass wasting. The disturbance caused to access these road miles would outweigh the benefits of treatment. The remaining 3.1 miles of the non-storm-proofed miles are open road which have been inventoried and scheduled for storm-proofing over the next 2 years pending establishment of the WDR (Figure 3-2).

Future road construction over the next decade is primarily limited to spur roads ranging from 150 to 500 feet in length across mostly gentle to moderate slopes (<50%). A feasibility assessment for the construction of new roads within Stitz Creek will be done concurrently with future THP development and will use input from licensed geologists when potentially unstable areas are identified. Slope stability (e.g. presence of inner gorge slopes, debris slide slopes, and other unstable areas) and future maintenance considerations will be the determiners as to what extent, if any, new road construction is feasible. If feasible, construction of new roads will prove beneficial to the landowner by reducing harvesting costs, improving access for reforestation, wildlife management, and wildfire control activities. The scoping of a potential road alignment will be conducted by a registered professional forester and reviewed by a licensed geologist and if considered feasible will be proposed and evaluated as part of the CEQA-equivalent, multi-agency THP review process.

Wet Weather Road Use and road construction/re-construction restrictions and requirements, to be implemented for the protection of water quality, are described in Section 6.0.

6.0 Sediment and Adverse Stream Temperature Prevention and Minimization Strategy

This section identifies measures to be implemented during future forestry activities for:

- Riparian and Watercourse Protection
- Landslide Prevention
- Harvest-Related Sediment Prevention
- Road-Related Sediment Prevention

6.1 HCP Watershed Analysis Prescriptions (LEED 2004)

All timber operations in the Stitz Creek watershed are subject to the Lower Eel/Eel Delta (LEED 2004) Watershed Analysis Prescriptions.

These enforceable forestry prescriptions were established as part of the HCP Watershed Analysis process (HCP 6.3.2) in collaboration with state and federal HCP signatory wildlife agencies including DFW, NOAA Fisheries, and USFWS. The prescriptions prevent or minimize sediment delivery to streams and maintain and restore riparian forests for the benefit of shade canopy and large woody debris recruitment through restrictions and/or specific requirements for timber harvest and road construction/re-construction activities in riparian areas, steep streamside slopes, and unstable areas.

LEED Prescriptions Based on Watershed Analysis are provided in Appendix D.

Some key elements of the prescriptions include:

1. 100 foot no-harvest zones adjacent Class I and II watercourses, with licensed geologic review and additional harvest restrictions applicable up to 300 feet slope distance from the watercourse, dependent upon watercourse classification and slope condition (e.g. >50% slope) [*sediment; temperature; LWD recruitment*];
2. licensed geologic assessment required for proposed harvest on slopes greater than 50% within 300 feet of a Class III watercourse [*sediment*];

3. licensed geologic assessment (per CGS note 45) and retention of a minimum of 150 ft^2 of basal area per acre required for harvest in headwall swale areas connected to Class I, II, or III watercourses [*sediment*];
4. No timber harvest or road construction/re-construction on unstable areas (e.g. inner gorge, headwall swale, earthflow, debris slide slope) and/or slopes >60% without on-site licensed geologic assessment including due consideration of risk to downslope aquatic habitat [*sediment*];
5. Ground-based equipment exclusion zones (EEZ) adjacent to watercourses [*sediment*]:
    a. Class I watercourses – minimum 150 feet
    b. Class II watercourses – minimum 100 feet
    c. Class III watercourses – minimum 50 feet or hydrologic divide

Watershed Analysis prescriptions are subject to modification as a result of WA re-visitation or HCP adaptive management.

6.2 Control of Sediment from Roads and Other Sources

Section 6.3.3 of the HRC HCP establishes measures for control of sediment from roads and other sources. A brief synopsis of each relevant HCP section is provided in this section with full HCP sediment control measures provided in Appendix E.

6.2.1 Road Construction, Reconstruction, and Upgrades

HCP section 6.3.3.3 describes standards and guidelines for road construction, reconstruction, and upgrades. These measures are intended to prevent and minimize sediment delivery during and subsequent these activities.

6.2.2 Road Maintenance

HCP section 6.3.3.4 describes measures to be taken to prevent or minimize sediment delivery related with road maintenance activities.

6.2.3 Road Inspections

HCP section 6.3.3.5 outlines road inspection requirements to be conducted to insure roads maintenance needs are identified on an annual basis and in response to large storm events.

6.2.4 Wet Weather Road Use Restrictions

HCP section 6.3.3.6 describes conditions under which various types of road use – from log hauling to light vehicle use - is permitted during the wet weather period (October 15 – May 1). Roads are required to meet and be maintained to a specific 'permanent' standard designed to minimize sediment delivery if log hauling is to occur during dry periods of the wet weather period.

6.2.5 Measures to Minimize Surface Erosion in Riparian Areas

HCP section 6.3.3.8 describes specific environmental conditions relative to exposed soils in riparian areas that require application of effective erosion control measures and the timing within which application must occur.

6.3 Methodology for Conducting THP Geologic Review

HRC uses a multivariate approach for evaluating landslide hazards relative to proposed land use activities within the Stitz Creek watershed. Data generated from both qualitative and quantitative approaches are assessed.

As part of THP planning, a review of pertinent published technical data including landslide inventories, regional geomorphic maps, and historic stereo-paired aerial photographs are conducted to denote potential high risk slopes. The *Hillslope Management Check List* is used to identify regions susceptible to landslide processes based on the Lower Eel and Eel Delta Watershed Analysis (PALCO 2004).

Following the evaluation of available data, a ground based investigation is conducted, as warranted, to further examine mapped landforms and features previously unobserved as well as to determine the relation of mass wasting events (if present) to past land use activities. This investigation also includes the collection of general landslide attributes for use in the comprehensive watershed-wide landslide inventory.

A report containing pertinent data, conclusions, and remedial treatment recommendations is developed when site conditions, land use activities, and watershed analysis prescriptions warrant. This report is signed by a state licensed professional geologist (P.G.) and prepared in general conformance with California Geologic Survey (CGS) Note 45 guidelines. Hazard reduction measures prescribed in the report are developed in association with a state license professional forester (R.P.F) and follow procedures detailed in the Lower Eel and Eel Delta Watershed Analysis.

6.4 Watershed-Wide Harvest Rate

In addition to individual THP measures, HRC recognizes the NCRWQCB's concern over the potential for cumulative adverse effects if too much harvest occurs in the watershed over too short a time period.

In order to insure meeting the NCRWQCB's mandate for restoration of all the beneficial uses of Stitz Creek, HRC proposes establishing (within the WDR), a maximum watershed-wide harvest rate of no greater than 30 percent of the total watershed area within a ten year time period (2013-2022).

Details regarding planned harvest over the next ten years are provided in Section 5.0 of this document.

6.5 California Forest Practice Rules and Department of Fish and Wildlife Code 1600

The following California Forest Practice Rule (FPR) requirements and restrictions on timber operations are designed to prevent and/or minimize adverse effects to watershed and water quality values including those potentially resulting from sediment delivery and removal of streamside riparian canopy. These rules are enforced by CAL-FIRE.

Reference	Description	Citation
FPR	Erosion Hazard Rating	912.5
FPR	Cumulative Impact Assessment	912.9
FPR	Post Harvest Stocking	913
FPR	Tractor Ops Limitations	914.2 (f)
FPR	Site Preparation Addendum	915
FPR	Servicing of Logging Equipment	914.5
FPR	Waterbreaks	914.6
FPR	Winter Ops	914.7
FPR	Tractor Crossings	914.8
FPR	Watercourse and Lake Protection	916
FPR	Domestic Water Supply Protection	916.10
FPR	Logging Practices	921.5
FPR	Logging Roads and Landings	923 et. Seq.
FPR	Road Maintenance Period	923.4
FPR	LTO Requirements	1022.1

A THP prepared by a registered professional forester must be approved by California Department of Forestry prior to conducting timber operations. The plan is subject to multi-disciplinary state and federal review as well as review by the public prior to approval. Site specific recommendations for the protection of water quality and related beneficial uses may be made and incorporated into the THP during this review process.

In addition, formal agreements must be reviewed and approved by the California Department of Fish and Wildlife prior to lake or streambed alteration which includes the construction and/or removal of stream crossings where such activities may affect aquatic habitat. Site-specific DFW recommendations for the benefit of water quality and related beneficial uses may be made and incorporated into these agreements.

6.6 THP Monitoring and Reporting

HRC proposes the following THP monitoring and reporting program for areas of active operations:

Active harvest areas including harvest units, appurtenant roads and individual erosion control sites will be inspected a minimum of three times per year. 'Active' is defined as project areas where timber operations have commenced.

1. Inspect harvested areas, appurtenant roads, and ECP sites by November 15 assure project areas are secure for the winter; and/or immediately following cessation of winter period timber harvest activities.
2. Inspect harvested areas, appurtenant roads, and ECP sites again following 10 inches of cumulative rainfall between November 15 and March 1 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharge sources have developed.
3. After April 1 and before June 15, asses the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharge sources have developed.

Inspection records will be maintained for each THP and reported to the NCRWQCB annually. Discharges in potential violation of the Basin Plan will be reported to the NCRWQCB at the time of discovery. Inspections will be continued until a final completion report has been received from CAL-FIRE and an ECP Notice of Termination submitted to the NCRWQCB.

No ECP inspections will be required where timber harvest activities have not commenced.

7.0 Water Quality Monitoring

Turbidity and suspended sediment concentration monitoring has not been conducted in the Stitz Creek watershed by HRC.

HRC briefly monitored a number of habitat quality characteristics in Stitz Creek, which established baseline data to guide future adaptive management practices in the watershed and [to a lesser extent] determine trends in habitat quality/quantity over time.

The monitoring program was initiated in 1999 by conducting a longitudinal thalweg profile along a 180 meter long reach and a cross-sectional profile of the channel at a location which would later become ATM Station 171 (established in 2000). These channel surveys were then repeated the following year in the summer of 2000, with the establishment of ATM Stations 171 and 172. Comprehensive habitat

characteristics were measured at both locations in 2000, including surface substrate size distributions, pool dimension & frequency, and large woody debris piece frequency. Both ATM stations were discontinued after just one year of habitat data collection, although stream temperatures were monitored for several additional years at Station 171 (2004-2018) and once at Station 172 (2016) due to an erroneous placement of the temperature logger. Stream temperature data collection will continue at ATM Station 171 into the future until further notice.

HRC's Water Quality Monitoring Summary for the Stitz Creek Watershed (1999-2018) is included as Appendix F and includes methodology, results summary, and discussion of trends observed.

8.0 Salmonid Habitat Restoration Assessment

Stitz Creek riparian conditions were dramatically affected by mid-twentieth century and subsequent pre-HCP logging activities which removed streamside shade canopy and had adverse effects on slope stability which, in combination with earthquakes and significant storm events, has resulted in periods of elevated stream temperature and landslide-derived sediment blanketing the channel for much of the Class I (fish-bearing) reach of the stream. The most recent watershed-wide disturbing storm event occurred in December 1996, which caused disruptions to both channel and habitat characteristics. Recognition of these events and their effects is the basis for the NCRWQCB's request for watershed-wide waste discharge requirements.

Based on HRC's current knowledge of Class I extent, Stitz Creek and its tributaries provides approximately three miles of suitable spawning, rearing, and overwintering habitats for resident steelhead and cutthroat trout. Chinook and coho salmon have also been observed in years prior, but are restricted to the lower portion of the watercourse due to the culvert beneath the Shively Road crossing which is thought to be a barrier to anadromy.

The California Department of Fish and Wildlife (CDFW) conducted two separate stream inventory assessments in the summers of 1992 and 2010 (see appendixes G and H). Each of these surveys collected comprehensive data on habitat characteristics and provided recommendations for future restoration activities to enhance Stitz Creek as an anadromous, natural production Class I watercourse. Most notably, modifications to the Shively Road culvert should be considered to restore anadromous fish passage and allow woody debris accumulations (LDAs) to pass downstream at an uninterrupted rate. Strategic modifications to existing LDAs may allow the mobilization of woody material and slow release of fine sediments trapped within. Where feasible, it was recommended that log/root wad structures be engineered and strategically placed in flatwater habitat units to increase the overall frequency, depth, and complexity of pool habitats to support rearing juvenile salmonids.

HRC may be interested in partnering with state and federal agencies, non-profits, and Humboldt County in the development and implementation of an instream/riparian plan and barrier modification to improve anadromous fish habitat in Stitz Creek.

9.0 List of Figures

10.0 List of Appendices