8^{th} Biennial Report
Aquatic Habitat Conservation Plan

Submitted to

National Marine Fisheries Service

and

United States Fish and Wildlife Service

By
Green Diamond Resource Company

in fulfillment of requirements pursuant to
NMFS Permit No. 1613
and
USFWS Permit No. TE156839-0

March 15, 2023

Certification of Report

Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, that information submitted is true, accurate, and complete.

Peter Jackson, Vice President and General Manager
Green Diamond Resource Company

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I. Introduction

On June 12, 2007 the National Marine Fisheries Service and the United States Fish and Wildlife Service accepted Green Diamond Resource Company's (GDRCo) Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances (AHCP). On this date, NMFS issued GDRCo an ESA section 10(a)(1)(B) permit authorizing incidental take coverage for listed and unlisted populations of three fish under its jurisdiction: Chinook salmon, coho salmon, and steelhead. In addition, the USFWS issued Green Diamond an enhancement of survival permit for two unlisted fish and two unlisted amphibians under its jurisdiction: resident rainbow trout, coastal cutthroat trout, tailed frog, and southern torrent salamander. The incidental take permit (ITP) and the enhancement of survival permit (ESP) collectively are cited as "Permits". NMFS and USFWS collectively are cited as "the Services." The species identified above collectively are cited as the "Covered Species."

GDRCo began implementing the AHCP on July 1, 2007. The AHCP includes management measures for riparian zones, geologically sensitive areas, forest roads, and harvesting activities. The riparian management zones provide shade, nutrients and large woody debris recruitment potential for streams through tree retention. The slope stability measures provide protection for upslope areas to minimize management-related landslides and sediment delivery to streams. The road management plan consists of an accelerated road upgrading and decommissioning program to reduce road-related sediment delivery to streams. The harvest-related measures consist of seasonal and equipment restrictions for silvicultural and logging activities to minimize the level of ground disturbance.

The AHCP also includes a monitoring program that was designed to evaluate the implementation and overall effectiveness of the plan and to fine-tune specific conservation measures as needed through adaptive management. The effectiveness monitoring will measure the success of the conservation measures in relation to specific biological goals. These biological goals are to maintain cool water temperatures for aquatic species covered by the AHCP, minimize management related sediment inputs to streams, provide for recruitment of large woody debris for stream habitat, maintain amphibian populations across the landscape, and monitor and adapt the plan as needed to optimize conservation measures to benefit the Covered Species.

The following report documents the twelfth and thirteenth full year of the AHCP implementation and includes details to comply with the AHCP and the Implementation Agreement (IA). Included are sections related to the application of conservation measures in timber harvest plans, compliance training programs for employees and contractors, road management implementation, and other information required for the biennial reports as specified in Section 8.0 of the Implementation Agreement.

The reporting period for this report is January 1, 2021 through December 31, 2022.

II. AHCP Compliance

A. AHCP Implementation Plan

During the early stages of implementing the AHCP it was mutually agreed upon by GDRCo and the Services that an Implementation Plan should be prepared that would serve as a road map outlining how GDRCo will achieve the biological goals of the AHCP through implementing the Plan. GDRCo developed an AHCP Implementation Plan (IP) and submitted a revised version in February 2009. NMFS, on September 29, 2009, and the USFWS, on October 13, 2009 provided letters to GDRCo acknowledging receipt of the IP and had no objections to the content of the document. The Services and GDRCo acknowledge that the IP serves as a foundational document that summarized recent activities to implement the AHCP to date, as well as planned approaches that GDRCo will use to ensure the AHCP is successfully implemented. It was also understood by all Parties that the IP provides guidance for the initial stages of implementing the AHCP and is intended to remain flexible and adaptive throughout the life of the AHCP, as future conditions warrant.

B. Field Trials and Demonstrations with Mechanized Equipment

Under AHCP Section 6.2.4.1 GDRCo may conduct field trials with mechanized equipment for silvicultural operations provided that we have given assurances to the Services that the equipment will not cause compaction or soil displacement that is measurably greater than the equipment or methods previously used. GDRCo has also proposed a new operation via a demonstration to show the feasibility of conducting the activity with very careful planning and assessment and by following specific conditions with oversight. The field trials and demonstrations that were conducted during the reporting period for this Biennial Report are described below.

1. Field Trials with Cut-to-Length Harvester

In 2016 GDRCo began assessing the use of state of the art cut-to-length equipment manufactured by Ponsse for ground based commercial thinning operations during the summer period. The ground based cut-to-length equipment used consisted of a feller-buncher harvester (Ponsse Bear model) with a H8 processor head. The feller-buncher has eight low pressure rubber tires with independent suspension. The tires are interconnected in pairs with tracks that provide additional traction and further reduce overall ground pressure. The feller-buncher has an articulating processor head that cuts, delimbs, bucks and bunches logs. As each harvested tree is processed, logging slash is laid out in front of the harvester to travel on to avoid bare mineral soil and to reduce ground compaction. Like a shovel logger, the feller-buncher operates on the terrain without the need for constructed skid trails because it has ample ground clearance to clear cut stumps and other obstacles (AHCP Section 6.2.4.7). During thinning operations, the harvester only processes short logs which are loaded onto a forwarder (e.g. Ponsse ElephantKing model), so there is no dragging of logs which is typical during tractor and skidding operations. The ElephantKing forwarder has a similar frame, tire and suspension configuration as the feller-buncher except it is capable of loading and carrying processed logs. The forwarder follows the same access path as the feller-buncher which has created a slash packed trail. The original language in the AHCP provided provisions for feller-buncher operations during the summer and winter period however it limited forwarding operations to the summer period only (AHCP Section 6.2.4.7).

On August 1, 2016 GDRCo submitted a letter to the Services describing the intent to conduct a field trial using state of the art cut-to-length forwarding equipment manufactured by Ponsse for ground based commercial thinning operations during the winter period. As described above GDRCo conducted preliminary evaluations of the equipment during the summer of 2016 to assess the viability of the forwarding operations and its potential for wintertime use and determined the results were very favorable. GDRCo had multiple discussions with the Services and held a field trip on August 18, 2016 at a summer-based cut-to-length operation with the equipment proposed for use during the winter.

In October 2016 GDRCo submitted a revised letter to the Services that included additional measures proposed by the Services and a description and proposal for quantitatively evaluating the site impacts from the forwarding operations related to potential water quality effects, fire hazard and stand condition following operations. GDRCo also worked with Dr. Han, former professor at Humboldt State University, who had two graduate students that conducted studies to evaluate cost and productivity of the cut-to-length operations (Baek, 2018) as well as impacts on soils and residual trees (Hwang, 2018).

In November 2016 GDRCo received support from the Services on the proposed winter field trial with the Ponsse forwarder for use on slopes less than or equal to 45%. In December 2016, GDRCo and the Services had a field visit to both an active and recently completed winter cut-to-length forwarding operation. In June 2017 GDRCo and the Services had a field visit to the completed winter cut-to-length forwarding operations. We walked several access trails in several units to review the data collection process and summary results from GDRCo’s evaluation of the operations as well as the Dr. Han’s graduate student projects.

In October 2017, GDRCo provided the Services a final summary report on the results of the 1st year field trial with the Ponsse forwarder.

Due to the success of the winter forwarding operation in the 1st year field trial, GDRCo proposed and received concurrence from the Services in October 2017 to conduct a 2nd year field trail which included operating forwarders on slopes up to 45% during the winter period. Forwarding during the 1st year field trial occurred on slopes that averaged less than or equal to 15%. In May 2019, GDRCo provided the Services with a summary report from the 1st and 2nd year field trial results.

The results from the 1st and 2nd year field trials suggest that winter forwarding with the cut-to-length low ground pressure equipment is a viable operation that does not construct or require the use of skid trails and can minimize bare mineral soil and minimize ground disturbance by placing and operating on slash generated by the activity. Based on these results, GDRCo included a minor modification request to add winter forwarding with cut-to-length equipment to the AHCP. The Services provided GDRCo interim authorization to continue the field trial for a 3rd season while the minor modification was being developed and approved. On July 10, 2019, the Services approved the minor modification authorizing forwarding operations during the winter period with specific provisions that were incorporated in the AHCP (see Section II.D.3 below).

2. Demonstration for Road Rocking During the Winter Period

The AHCP permits road rocking operations during the period when road upgrading can occur (AHCP 6.2.3.9.2 #3) which is during the summer period and the dry fall and early spring drying conditions (AHCP 6.2.3.4.2 and 6.2.3.4.3). Occasionally there are extended periods of dry weather during the winter period that occurs which GDRCo believes can create conditions that are suitable to conduct road rocking activities without causing negative environmental effects. In 2019 GDRCo developed a proposal to conduct a road rocking demonstration during the 2019/2020 winter period to show the feasibility of this potential winter season activity. A field trip with the Services was held on September 13, 2019 to discuss the proposed winter road rocking demonstration. We visited several road segments that GDRCo propose for the demonstration and reviewed and discussed all the mitigation measures that would be followed. GDRCo submitted the proposal on September 27, 2019 and the Services approved the winter road rocking demonstration on October 25, 2019. GDRCo and the Services conducted another field visit on February 10, 2020 to observe an active winter road rocking operation as well as visit a couple road segments that were rocked earlier in the winter period and had experienced winter storms to evaluate how the roads performed following rain events. It was evident that the operations were successfully being implemented.

Following the 2019/2020 winter period, GDRCo's Sr. Aquatic Biologist conducted field visits with the Roads Supervisors to all the road segments that were included in the winter road rocking demonstration to photograph and assess the road conditions since the COVID-19 pandemic prevented the Services from participating in field trips during the 2020 summer period. GDRCo provided the Services with a summary report of the assessments on October 12, 2020. GDRCo determined that the winter road rocking demonstration was very successful. GDRCo also submitted a proposal for a minor modification request to Services requesting the AHCP be modified to allow for winter road rocking with specific provisions. The Services' approval of the proposed minor modification is pending.

C. Commercial Thinning

In 2010, GDRCo implemented a study to evaluate the economic viability and operational feasibility of conducting commercial thinning on certain properties within the Plan Area. GDRCo uses the Functional Approach to thinning that has been adapted to young-growth, even-aged stands of Redwood and Douglas-fir. With this method, trees from all size classes and crown positions may be removed to create open spaces in the canopy to promote growth of the retained trees. Small intermediate and understory trees may be harvested if they are of commercial size and economical to harvest. Codominant and dominate trees with poor form or low live crown ratio are selected for harvest to open up the canopy, and some trees are selected for harvest to reduce stand density and improve leave tree spacing. The crop trees retained exhibit the highest quality and fastest growth rates to take advantage of the crown openings. The overall objective is to accelerate diameter growth, increase heartwood production, and improve log quality. GDRCo's Functional Approach to thinning is very similar to the Commercial Thinning Method in the State Forest Practice Rules. In some site-specific cases, GDRCo may utilize a Forest Practice Rule "Alternate Prescription" that meets these same silvicultural objectives but is a better fit due to stand structure and forest practice rule requirements.

GDRCo forestry staff carefully prepares THPs to ensure that this management technique incorporates mitigations that are consistent with the AHCP requirements. GDRCo has not experienced any issues with the current AHCP measures outlined in AHCP Section 6.2.4.3. We are not conducting any thinning operations in the riparian areas of the thinning THPs as per AHCP Sections 6.2.1.2 and 6.2.1.4. As per the requirements in this AHCP section, riparian management zones are identified and mapped as no harvest areas in each thinning unit and a selection harvest entry within these riparian areas will coincide with the future even-aged harvest of the stand. However, GDRCo has recently been discussing with the Services the idea of applying GDRCo's Functional Approach to thinning in riparian zones to similarly promote faster diameter growth of trees in these areas. GDRCo anticipates submitting a proposal to the Services in 2021, requesting authorization of additional entries into RMZs that will provide benefits to terrestrial and aquatic species and their habitats.

In the past 10 years, GDRCo has commercially thinned approximately 2,000 to 4,000 acres per year depending on availability of timber stands that are suitable for thinning and economic factors that are favorable to thinning. GDRCo plans to continue to conduct thinning operations on approximately 2,000 to 4,000 acres per year over the next 10 years. As a result of the thinning operations, we expect to see increased vigor and growth of the remaining stands.

D. AHCP Minor Modifications

Under Section 12.1 of the Implementation Agreement (IA), GDRCo, NMFS, or USFWS (referred to collectively as “Parties” or individually as “Party”) may propose minor modifications to the Plan, the Permits, or the IA by providing written notice to all the other Parties. A proposed minor modification becomes effective and the Plan deemed modified accordingly, immediately upon unanimous approval from all Parties. Any Party that objects to a proposed modification must provide written notice to the other two Parties. As per Section 12.1.1 of the IA, a receiving Party may object to a proposed minor modification based on reasonable belief that the modification would result in, 1) operations, burdens or obligations under the Plan that are significantly different from those analyzed in connection with the original Plan, 2) adverse effects on the environment that are new or significantly different from those analyzed in connection with the original Plan, or 3) additional take not analyzed in connection with the original Plan.

There were 2 minor modifications proposed by GDRCo that the Services evaluated and approved under IA Section 12.1 during the reporting period for this Biennial Report. The modifications that were made to the AHCP are summarized below.

1. Minor Modification to AHCP Sections 6.2.3.9.2 and 6.3.3.8.1 Winter Period Road Rocking.

In 2019 GDRCo proposed to conduct a road rocking demonstration during the 2019/2020 winter period to show the feasibility of this proposed winter season activity. We held a field trip with the Services on September 13, 2019 to discuss the proposed winter road rocking demonstration. We visited a few road segments that we proposed to include in the demonstration and reviewed and discussed all the mitigation measures that would be followed. GDRCo submitted the proposal on September 27, 2019 and the Services approved the winter road rocking demonstration on October 25, 2019. We conducted another field visit on February 10, 2020 to observe an active winter road rocking operation as well as visit a couple road segments that were rocked earlier in the winter period and had experienced winter storms to evaluate how they performed following rain events. On October 12, 2020, GDRCo submitted to the services a minor modification proposal allowed road rocking and winter site preparation with shovel logging equipment during the winter period.

On December 20, 2021, the Services submitted a letter to GDRCo approving the minor modification request. The minor modification changed language in the existing AHCP Section 6.2.3.9.2 (road rocking) and existing AHCP Section 6.3.3.8.1 (road rocking).

Note the text in italics are excerpts from the AHCP and underlined text is the language that was added with this minor modification.

6.2.3.9 Routine Road Maintenance and Inspection Plan

6.2.3.9.2 Time of Year Restrictions

1. *Green Diamond may carry out patch (spot) rocking, brushing, cleaning inlets and outlets of culverts, cleaning ditches where poor drainage is occurring, repairing or maintaining existing waterbars, replacement of a failed or imminently failing culvert along a needed access road, and site specific road surface grading for maintaining the integrity of the road surface year-round, including during the winter period.*

2. *Grading will not be used to blade off wet soil to provide conditions for extended periods of operation on a deteriorated road surface.*

3. *The installation of waterbars, rolling dips and critical dips, general project grading for shaping the road surface, road outsloping, road rocking, resurface rocking, cleaning ditch lines, and general culvert replacements may occur only during the period when road upgrading may occur (see 6.2.3.4.1, 6.2.3.4.2, and 6.2.3.4.3) except as allowed in item #4 below.*

4. Road rocking and resurface rocking can occur during the winter period when the following conditions are met:

    a. The existing road to be rocked is hydrologically disconnected with ditch relief culverts and rolling dips and have critical dips associated with each stream crossing.

    b. Minimize daily road opening (i.e. minor road surface preparation such as grading out water bars, installing drainage cutouts, minor vegetation clearing on the road surface to facilitate geotextile fabric installation and installing additional ditch relieve culverts where needed) to an amount that can be rocked in a single day. The winter rocking activities will be conducted from roads with a rocked surface and only extend onto dirt surfaces that they intend to rock on any particular day. Waterbars will be reinstalled, as needed, on any opened road segment that is unrocked by the end of each day if rain is forecast the next day.

c. Geotextile fabric will be laid out on the road surface prior to road rocking.

d. No rocking can occur if rain occurred the previous day.

e. No rocking can occur on days of forecasted rain (20% or greater chance) unless the rain is forecasted to occur for after 5 p.m. that day.

f. Road rocking will cease when the activity results in runoff of waterborne sediment in amounts sufficient to cause a visible increase in turbidity in any ditch or road surface that drains into a Class I, II or III watercourse.

g. Log hauling will not occur on any road segment that contains watercourse crossings that were winter rocked during the current winter period. Road segments with no watercourse crossings that were winter rocked during the current winter period can be used for log hauling.

h. Stream crossings with road approaches (between the hydrologic divide) that were rocked prior to the winter period can be used for log hauling during the winter period provided the intervening road segments are rocked (including during the winter period).

i. Two days of no rain must be met before rock hauling across winter rocked watercourse crossings can occur.

j. Additional clean competent rock will be applied by the end of the day to watercourse crossings if rutting or pumping of fines is occurring when rain is forecasted for the next day.

6.3.3.8.1 Type and Timing of Maintenance Activities

Road maintenance activities that will be conducted include but are not limited to brushing, waterbarring, constructing rolling dips, culvert replacement, grading (including berm removal or maintenance where appropriate), installation of critical dips at watercourse crossings to reduce diversion potential, outsloping roads, patch rocking, dust abatement, resurface rocking, cleaning ditches, and cleaning inlets and outlets of culverts. Patch (spot) rocking, brushing, cleaning *inlets and outlets of culverts, cleaning ditches where poor drainage is occurring (e.g., cleaning a ditch line along a sloughed cut-bank), repairing or maintaining existing waterbars, replacement of a failed or imminently failing culvert along a needed access road, and site specific road surface grading for maintaining the integrity of the road surface (i.e. redistribution of existing rock, filling pot holes, and distributing new patch rock) will be allowed year round including during the winter period. The intent is to allow winter grading to fix localized bad spots on the road surface before the deterioration of longer road segments. Grading will not be used to blade off wet soil to provide conditions for extended periods of operation on a deteriorated road surface. The installation of waterbars, rolling dips and critical dips, general project grading for shaping the road surface, road outsloping, road rocking, resurface rocking, cleaning ditch lines, and general culvert replacements will be allowed only during the period when road upgrading can occur (Section 6.3.3) except as allowed below.*

Road rocking and resurface rocking can occur during the winter period when the following conditions are met:

a. The existing road to be rocked is hydrologically disconnected with ditch relief culverts and rolling dips and have critical dips associated with each stream crossing.

b. Minimize daily road opening (i.e. minor road surface preparation such as grading out water bars, installing drainage cutouts, minor vegetation clearing on the road surface to facilitate geotextile fabric installation and installing additional ditch relieve culverts where needed) to an amount that can be rocked in a single day. The winter rocking activities will be conducted from roads with a rocked surface and only extend onto dirt surfaces that they intend to rock on any particular day. Waterbars will be reinstalled, as needed, on any opened road segment that is unrocked by the end of each day if rain is forecast the next day.

c. Geotextile fabric will be laid out on the road surface prior to road rocking.

d. No rocking can occur if rain occurred the previous day.

e. No rocking can occur on days of forecasted rain (20% or greater chance) unless the rain is forecasted to occur for after 5 p.m. that day.

f. Road rocking will cease when the activity results in runoff of waterborne sediment in amounts sufficient to cause a visible increase in turbidity in any ditch or road surface that drains into a Class I, II or III watercourse.

g. Log hauling will not occur on any road segment that contains watercourse crossings that were winter rocked during the current winter period. Road segments with no watercourse crossings that were winter rocked during the current winter period can be used for log hauling.

h. Stream crossings with road approaches (between the hydrologic divide) that were rocked prior to the winter period can be used for log hauling during the winter period provided the intervening road segments are rocked (including during the winter period).

i. Two days of no rain must be met before rock hauling across winter rocked watercourse crossings can occur.

j. Additional clean competent rock will be applied by the end of the day to watercourse crossings if rutting or pumping of fines is occurring when rain is forecasted for the next day.

Weather patterns, antecedent moisture conditions, road surface drying and overall soil conditions vary extensively both spatially and temporally across GDRCo's ownership. As a result, describing specific weather, road and soil conditions that would create suitable prerequisites to initiate winter road rocking activities would be difficult. Instead, GDRCo relies on the experience and expertise of our Road Supervisors/Administrators to make the determination of where and under what conditions it is appropriate to conduct winter road rocking following the provisions above. The Road Supervisors/Administrators will carefully evaluate road conditions and closely monitor weather conditions and weather forecasts for their operating areas to insure that a stable operating surface is maintained and no runoff of sediment results in amounts sufficient to cause a visible increase in turbidity to any ditch or road surface that drains into a Class I, II or III watercourse.

2. Minor Modification to AHCP Section 6.2.4.2.3 Winter Site Preparation with Shovel Logging Equipment.

The AHCP discusses shovel logging operations in Section 6.2.4.7 where it provides for its use and delineates limitations. Because the operating conservation measures of the AHCP were set in place several years before the Plan was approved during a time when GDRCo was still experimenting and learning the capabilities of shovel logging, the full array of harvesting opportunities and slash handing procedures with shovel equipment were not fully incorporated within the AHCP. One such example was identified early on in the implementation of the AHCP where the Services approved an AHCP minor modification in 2019 to permit GDRCo to pile logging slash concurrent with shovel logging activities during the winter period. In the minor modification approval, the Services recognized that piling of excess slash concurrently with shovel yarding operations during the winter period will not cause additional ground disturbance impacts over that which would be caused by the exclusive shovel yarding of logs. In fact the concurrent activity would eliminate subsequent remobilization and additional passes over the same ground at a later time to achieve the desired site prepared condition.

AHCP Section 6.2.4.7 provides for the use of shovel logging operations during the winter period with specific operational restrictions. However in the original AHCP, Section 6.2.4.2.3 did not allow any mechanical site preparation during the winter period. The AHCP minor modification was approved as follows to allow for winter period site preparation:

1) Green Diamond will minimize use of machine piling with tractor-and-brushrake; other mechanized methods or equipment will be used preferentially.

2) Use of mechanized site preparation methods will be limited to the period beginning May 15th and ending October 15th.

3) Mechanized slash piling with shovel logging (Helms, 1998) equipment may be conducted concurrent with shovel harvesting operations during the winter period, subject to all limitations under Section 6.2.4.7 and items (a) and (b) below.

   a. Site preparation operations with shovel logging equipment, are limited to slopes averaging less than 30% gradient.

   b. Shovel logging equipment will operate on a slash surface during site preparation operations.

At the time the minor modification was proposed and approved, GDRCo was not conducting shovel logging on slopes that exceeded 30% due to safety concerns. However, there have been many improvements and enhancements in the shovel equipment over the last 11 years including more powerful but lighter machines, lower ground pressure undercarriages, and self-leveling cabs that improves the stability of the machines for use on steeper slopes.

GDRCo can safely, efficiently, and effectively shovel log (and mechanically site prep) on steeper slopes including during the winter period. GDRCo believes that the piling of excess slash concurrently with yarding operations during the winter period will not cause additional ground disturbance impacts over that which would be caused by the exclusive yarding of logs. As such GDRCo is proposing a minor modification to the AHCP to remove the slope gradient limit for conducting winter time mechanized site preparation with shovel machines. This will align winter shovel site preparation conservation measures with those of the winter shovel logging operating conservation measures.

In 2016 GDRCo began investigating new state of the art cut-to-length equipment to conduct ground based commercial thinning operations which were initially initiated during the summer period. Following successful outcomes with the equipment, GDRCo submitted a letter to the Services in August 2016 describing our interest to conduct a field trial with the cut-to-length forwarding equipment for ground based commercial thinning operations during the winter period. GDRCo conducted a multi-year field trial as described above in Section II. B. above. Following the successful testing of the equipment and evaluation of the ground impacts during winter use, we determined that this is a viable operation. On May 31, 2019, GDRCo submitted to the Services a minor modification proposal to allow winter forwarding with cut-to-length equipment.

On December 20, 2021, the Services submitted a letter to GDRCo approving the minor modification request. The minor modification changed language in the existing AHCP Section 6.2.4.2.3 (mechanized site preparation methods).

Note the text in *italics* are excerpts from the AHCP and underlined text is the language that was added and the strikethrough is the language that was removed with this minor modification.

6.2.4.2 Site Preparation Standards

6.2.4.2.3 Mechanized Site Preparation Methods

1) *Green Diamond will minimize use of machine piling with tractor-and-brushrake; other mechanized methods or equipment will be used preferentially.*

2) *Use of mechanized site preparation methods will be limited to the period beginning May 15th and ending October 15th* <u>except as allowed in item #3 below.</u>

3) *Mechanized* <u>site preparation</u> ~~slash piling~~ *with shovel logging (Helms, 1998) equipment may be conducted concurrent with shovel harvesting operations during the winter period, subject to all limitations under Section 6.2.4.7 and items (a)* ~~and (b)~~ below.

   a. ~~Site preparation operations with shovel logging equipment, are limited to slopes averaging less than 30% gradient~~.

   b. *Shovel logging equipment will operate on a slash surface during site preparation operations.*

E. Forms for RPFs and Conservation Planning Staff to Document Pre-Harvest Conservation Measures for Each THP and Compliance with Those Measures Post-Harvest

RPFs, Operations personnel and other GDRCo Conservation Planning professionals utilize a combined form to identify, categorize, and document THP items that are managed and monitored under the Northern Spotted Owl and Aquatic HCPs. The form is used to summarize the specific application of HCP measures for each THP to help track these measures and features on the landscape. The summarized information is used to monitor compliance with GDRCo's NSO and Aquatic HCPs and is used to meet the reporting requirements of these Conservation Plans. A summary of the information collected on the Forms related to the implementation of the AHCP for approved THPs is provided in Section II.F.2 below. A summary of the information collected on the Forms related to the implementation of the AHCP for completed THPs is provided in Section II.F.3. It should be noted that the information collected for approved THPs is a "plan" and is subject to change for a variety of reasons or circumstances that might occur during the life of the THP. Some of these reasons/circumstances include but are not limited to; GIS errors, depletion corrections based on final harvest data, plan amendments, canceled plans, and resubmitted plans. Although the information associated with approved THPs may be subject to change during the life of the THP, it typically does not result in substantial variances in the average or total THP values.

F. Summary of THP Conservation Measures and Compliance with Those Measures While Operating Under the AHCP

1. Notice of Filings

As required in AHCP Section 6.2.7.2 and IA Section 4.1 (c), GDRCo has provided the Services with 59 new notification letters from January 1, 2021 through December 31, 2022, indicating that GDRCo has submitted a proposed THP within the AHCP Plan Area. The letter to the Services includes the Official Notice of Filing signifying the THP has been accepted by CalFire for filing, a copy of the THP map(s), a copy of the road-work table that will be completed as part of the Annual Work Plan associated with the Master Agreement for Timber Operations (if applicable), and a description and justification of any allowable AHCP exceptions (if applicable).

2. Summary of Conservation Measures for Approved AHCP THPs

<u>Overall totals/averages</u>

There were 68 THPs approved by CalFire within the Plan Area between January 1, 2021 and December 31, 2022. Table 1 is a general summary of acres approved for harvest, by harvest type, for the reporting period. The approved THPs consist of 12,327 total acres from 374 individual harvest units. The THPs range in size from 22 to 201 acres and average 190 acres. There are on average 5.6 harvest units per THP and the average unit size is 33 acres.

Due to a change in GDRCo's harvesting philosophy around 2010, our silviculture methods now include a substantial amount of commercial thinning (see Section II.C for additional discussion of this activity). Due to a technicality in the state rules for commercial thinnings, GDRCo sometimes determines that the most appropriate silviculture designation for the commercial thinnings would be Alternative Prescription. As a result, there is an inflated amount of Alternative Prescription acres shown in Table 1 which, in early reporting years, would have been represented in the "Other" harvest type. The number of acres of true Commercial Thinning (according to the state rules) for approved plans has also increased since that time; so those acres have been separated out from the "Other" category.

The total area listed in Table 1 does not equal the sum of the silviculture acres in the same table; there is a difference of 229 acres. The difference is attributable to rounding errors and a variance in the way road Right-of-Way acres can be reported as they are typically not included in the Total Acres of a harvest unit.

3. Summary of Conservation Measures for Completed AHCP THPs

Overall totals/averages

Completed THPs for this report include AHCP THPs where all the felling, logging, loading, and hauling have been completed for all the units in the timber harvest plan. Road work associated with completed THPs may or may not be finished and therefore will not necessarily match the completion of a THP according to CalFire's definition. Compliance of the AHCP regarding completion of road work is based on the amount of work accomplished each year as measured in dollars spent on treating high and moderate priority sites and not at the THP scale (see Section V.C). Therefore, the status of road work associated with individual THPs is not necessary in considering a THP as completed for purposes of this biennial report.

There was a total of 65 THPs that met the criteria for completed THPs during the current reporting period. The completed THPs ranged from a total of 14 to 383 acres in size and included a total of 369 harvest units that ranged in size from 5 to 322 acres. The Post-harvest completion forms for individual THPs are provided in Appendix A. Table 2 provides a summary of the acres harvested by harvest type for the 65 completed THPs.

The total area listed in Table 3 does not equal the sum of the silviculture acres in the same table; there is a difference of 149 acres. The difference is attributable to rounding errors and a variance in the way road Right-of-Way acres can be reported as they are typically not included in the Total Acres of a harvest unit.

Riparian

The average area of riparian features (aside from seeps, ponds, and wet areas) provided per THP was 30 acres. Table 3 summarizes the number of completed THPs that contained riparian features and the length of each feature in approved THPs with prescribed AHCP protection measures. There were a total of 37 wet areas, 31 seeps/springs and 5 ponds in 18 THPs that were provided with an average of 0.36 acres of protection.

Roads

All but one of the 65 completed THPs had proposed road work associated with them. As summarized in Table 4, the most common proposed road work associated with a THP was temporary road construction. As described in the AHCP, temporary road construction is designed for single use in a THP and is decommissioned upon completion of operations. This practice minimizes the risk of sedimentation from unused roads and reduces the amount of future road maintenance liability. It is also important to note that if temporary road construction is proposed in a THP, it does not mean that the road was constructed. In many cases the RPF provides additional flexibility to operators by identifying areas where a temporary road can be built if it is needed for operations.

Table 1. Summary of areas (acres) for each harvest type for the 68 approved THPs.

	Harvest Type							
	Total Area	Clearcut	Selection	No Harvest	Alternative Prescription[a]	Right-of-way	Commercial Thin	Other
Total Area (acres)	12,327	7,541	2,041	954	231	37	1,687	66
Number of THPs	68	61	60	63	8	18	12	3
Number of THP Units	374	338	319	259	10	N/A	31	5
Average Area (acres) per Unit	33	22	6	4	23	N/A	54	NA

[a] The majority of the Alternative Prescription acres are associated with GDRCo's commercial thinning operations as described in Section II.C.

Table 2. Summary of areas (acres) for each harvest type for 65 completed THPs.

	Harvest Type							
Summary Statistics	Total Area	Clearcut	Selection	No Harvest	Alternative Prescription[a]	Right-of-way	Commercial Thin	Other
Total Area (acres)	11,669	7,633	2,093	752	391	106	801	40
Number of THPs	65	63	64	62	5	42	4	6
Number of THP Units	369	346	321	244	10	N/A	14	7
Average Area per Harvest Unit (acres)	32	22	7	3	78	N/A	57	N/A

[a] The majority of the Alternative Prescription acres are associated with GDRCo's commercial thinning operations as described in Section II.C.

Table 3. Summary of the riparian features and the average length of each feature in the 65 completed THPs with prescribed AHCP protection measures, during the reporting period.

Riparian Features	Number of THPs with Riparian Features	Total Length of Riparian Features with AHCP Protection (feet)
Class I	40	205,599
Class II-1	64	244,008
Class II-2	60	338,799
Class III Modified Tier A	6	32,296
Class III Tier A	50	182,436
Class III Tier B	6	8,463
Class II-FPR	2	330

Table 4. Summary of proposed road work and the average length of proposed road work in the 63 completed THPs with road work, during the reporting period.

Road Work Type	Number of THPs with Proposed Road Work	Average Length of Proposed Road Work per THP (feet)
New Permanent Road Construction	4	9,920
New Seasonal Road Construction	40	142,541
Temporary Road Construction	59	268,309
Temporary Road Decommissioning	10	25,985
Reconstruction	20	55,936
Permanent Decommissioning	4	9,800

Geology

Geomorphic features defined within the AHCP include; deep-seated landslides (DSL), headwall swales (HWS), riparian slope stability management zones (RSMZ), slope stability management zones (SMZ), shallow rapid landslides (SRL), channel migration zones (CMZ), and floodplains. Table 5 summarizes the geomorphic features GDRCo observed within the 65 completed THPs for the current reporting period. RSMZs were the most frequently observed feature, which is to be expected as they are associated with steep slopes adjacent to Class I and Class II watercourses.

The distribution of geomorphic features and their association with the different types of watercourses is outlined in Table 6. The geomorphic features were most commonly associated Class II-2 watercourses. This is a logical observation as there was more linear length of Class II-2 watercourse in the approved THPs than any of the other watercourse types, which in turn equals more area of hill slopes adjacent to the Class II-2 watercourses that may intersect a geomorphic feature. It shall be noted that channel migration zones and floodplains are not included in this table as they are only associated with Class I watercourses.

All SSSs have an RSMZ but they may or may not have an SMZ associated with them. There are fewer SMZs than RSMZs since the SSS prescriptions are based on slope and may terminate once a qualifying break-in-slope has been identified (AHCP Section 6.2.2.1). Therefore, a SSS buffer may not extend as far as the SMZ resulting in more RSMZs than SMZs. There was a total of 41 THPs with RSMZs and a total of 17 THPs with SMZs delineated in the 65 completed THPs during the reporting period. Table 7 provides a more detailed summary of GDRCo's SSS prescriptions observed during the reporting period.

Table 5. Summary of geomorphic features observed within THPs during the reporting period.

Geomorphic Features	Number of THPs per Feature Type	Area of Features that were Afforded Default Protection (acres)
DSL	24	51
HWS	3	7
RSMZ (SSS)	41	164
SMZ (SSS)	17	40
SRL	48	292
CMZ	2	2
Floodplain	-	-

Table 6. The distribution of geomorphic features by watercourse type.

Watercourse Type	Geomorphic Feature				
	DSL	HWS	RSMZ	SMZ	SRL
Class I	35.3%	-	25%	49%	24%
Class II-1	27.5%	57%	28%	31%	36%
Class II-2	19.6%	-	47%	20%	32%
Class III Modified Tier A	-	-	-	-	1%
Class III Tier A	13.8%	29%	-	-	3%
Class III Tier B	3.9%	14%	-	-	2%
Total	100%	100%	100%	100%	100%

Table 7. Summary of SSS prescriptions associated by watercourse type.

	Watercourse Type		
	Class I	**Class II-1**	**Class II-2**
Total Area of SSS (combined RSMZ and SMZ) (acres)	107	44	107
Average Area of SSS per THP (acres)	5.1	1.9	4.3
Total Area of RSMZ (acres)	85	39	114
Average Area of RSMZ per THP (acres)	4.2	1.7	4.3
Total Area of SMZ (acres)	22.4	5.4	3.2
Average Area of SMZ per THP (acres)	2.5	0.7	0.6

Note: There were 41 THPs with RSMZs and 17 THPs with SMZs.

Exceptions

There were a total of 28 exceptions that were applied to 9 completed THPs during the reporting period; of the 28 exceptions, 26 were associated with AHCP geologic areas (harvest and road related). Table 8 summarizes the number of AHCP exceptions and Table 9 summarizes the total area of alternative geologic prescriptions that were applied to geomorphic features. The majority of AHCP exceptions were associated with alternative geologic prescriptions on geologic areas of concern. Most of the alternative geologic prescriptions were composed of varying levels of "selection" (Table 10). Clearcut areas accounted for 13% of the alternative geologic prescription areas and typically involve slides that do not deliver to a watercourse or road construction on or near a landslide that involves clearing of trees. Aside from no harvest, each of the other alternative geologic prescription types were recommended by a Professional Geologist based on site specific review.

Table 8. Summary of AHCP exceptions.

AHCP Exception Type	Number of AHCP Exceptions
Alternative Geologic Prescription	25
Class III Skid crossing	1
Use of landings within an RMZ	1
Road Construction on a DSL	1

Table 9. Summary of timber harvest plans with alternative geologic prescriptions.

Geomorphic Feature	Total Area (acres) of Alternative Geologic Prescriptions by Feature Type
DSL	8.7
HWS	-
RSMZ (SSS)	2.3
SMZ (SSS)	-
SRL	10.8

Table 10. Summary of harvest-related alternative geologic prescriptions and area of alternative geologic prescriptions applied per THP.

Alternative Prescription Type	Area of Alternative Geologic Prescription (acres)	Numbers of THPs with Alternative Geologic Prescription
No Harvest	3.35	3
75 ft² Basal Area Retention	0.7	1
100 ft² Basal Area Retention	5.24	3
150 ft² Basal Area Retention	9.75	2
Clearcut	2.81	4

Hazard Abatement Operations

There are five types of hazard abatement activities utilized across the ownership: biomass harvesting, burning of slash piles in clearcuts and landings, broadcast burning, and mastication. Biomass harvesting involves the removal of logging debris that typically is piled during active harvesting operations. The debris is removed from the harvesting area and is used as hog fuel rather than being burned on site. Clearcut pile burning is a form of hazard abatement where logging debris is accumulated into piles throughout the harvesting area during or after operations and burned on site during the winter period. Landing pile burning is also a form of hazard abatement where logging debris accumulates on designated landings rather than throughout the harvest unit; the landing piles are subsequently burned during the winter period. Broadcast burning involves a prescribed fire to burn over a designated area with well-defined boundaries to reduce the level of fuels and improve reforestation access. Mastication is mechanical grinding of slash material into small pieces of debris in order to reduce fuel levels and improve reforestation.

With the use of biomass harvesting, hazard abatement operations can be applied to harvest units over multiple reporting periods. Therefore, we summarize these operations separately for all units, regardless of THP completion status, that have been treated within the biennial reporting period. The two types of hazard abatement activities applied to 108 harvest units during the current reporting period were burning of clearcut piles and burning of landing piles (Table 11). There was no mastication, broadcast burning, or biomass harvest activities utilized during the current reporting period. All hazard abatement activities were completed as planned.

Table 11. Summary of hazard abatement activities.

Type of Hazard Abatement	Number of Harvest Units	Total Area of Hazard Abatement Activities (Acres)	Average Area of Hazard Abatement Activities per Harvest Unit (Acres)
Mastication	-	-	-
Burned Clearcut Piles	96	2,317	24
Burned Landing Piles	12	319	27
Biomass Harvesting	-	-	-
Broadcast Burned	-	-	-

Hazard Abatement Exceptions:
There were no Hazard Abatement Exceptions that occurred during the reporting period.

<u>Violations and Other Observations</u>

There were twelve violations associated with the 62 completed harvest plans during the current reporting period. A summary of each notice of violation is listed below.

THP 1-20-026HUM (GDRCo 48-1901):

- VIOLATION OF 14 CCR 1035.3(c)(3) Felling in a no harvest Geological Area – Timber was harvested in a portion of an area marked as a no harvest unstable area (B-3) on page 29 of the THP. Approximately 15 redwood trees, 12-inches to 24 -inches in diameter were felled. GDRCo reported the incident immediately.
  - *Mitigation* – Prior to inspection GDRCo and CAL FIRE agreed to leave the felled timber on site to prevent further disturbance.
- VIOLATION OF 14 CCR 1035.3(c)(3) logging in a no harvest Geological Area – Timber was harvested in a portion of an area marked as a no harvest unstable area (B-3) on page 29 of the THP. Approximately 15 trees were logged out of the zone resulting in a 12-inch-deep ground furrow in the cable road within the geological zone.
  - *Mitigation* – CAL FIRE inspector recommended removing the berm on the down slope side of the furrow and hand digging waterbars across the cable road to dissipate overland flows.

THP 1-17-057HUM (GDRCo 56-1611):

- Violation of 14 CCR 1035(d) Hauling prior to DRC installation - It was observed that 11 new ditch relief culverts (DRC) were installed between March 23, 2021 and April 12, 2021. These DRCs are identified in Plan as road points 109-121. The road work order states the DRCs are to be installed to hydrologically disconnect ditchlines from watercourses. Timing of this mitigation for nine of the road points is stated in the Plan as "prior to log hauling in the Winter Period (October 15 - May 1), with the exception of road points 112, 114, and 115. Log hauling was observed during inspection number 7 (March 23, 2021).

  - *Mitigation* – All road points identified in the Plan to be installed prior to log hauling during the winter period are to be installed before hauling can resume..

THP 1-19-094HUM (GDRCo 56-1806):

- Violation per California practice rule 14 CCR 1035.1(f) – Harvesting within a designated no harvest Geological Zone. A geology zone in unit E identified on the map was not flagged in the field prior to the commencement of operations. This resulted in the LTO cutting and harvesting a 0.25-acre portion of the mapped landslide outside of the RMZ/WLPZ.
  - *Mitigation* - The landslide and the associated buffers in Unit E shall be planted by June 1, 2022, to the Forest Practice Stocking standards. The landslide area shall also be monitored to document any changes or erosional issues that would affect water quality. If changes in slope stability occur the RPF shall notify CALFIRE and CGS at the time of discovery. Monitoring shall take place after the winter period (April 1) each year and will cease when unit E meets stocking. A monitoring report shall be submitted to CGS and CAL FIRE by June 1 each year of inspection.

THP 1-19-199DEL (GDRCo 93-1903):

- Violation per 14 CCR 1035 3(d): Timber operations in a no harvest Geological zone. Never Give Up Logging Inc felled and yarded a portion of a no-harvest area designated for protection of a Deep-Seated Landslide. Area was clearly depicted on the THP map and appeared to be adequately flagged prior to operations.
  - *Mitigation*: Landowner shall ensure harvested area meets the stocking requirements for even-aged management..

III. Land Transactions and Plan Area Adjustments

The AHCP Implementation Agreement (IA) has two distinct requirements involving both the reporting of land transactions as well as the accounting of these transactions as they relate to Plan Area limitations described in the IA.

The following is a description of GDRCo's compliance with Sections 8.2, 11 and 12 of the IA regarding Land Transactions and Plan Area Adjustments and a summary of transactions reported to the Services as required in Section 8.1(c) of the IA.

A. Notice of Transactions

Section 8.2 of the IA requires GDRCo to notify the Services of any transfer of ownership of real property or harvesting rights subject to the AHCP at the time of the transfer of ownership (except where prior notification is required pursuant to IA Section 11 – which is discussed below). To comply with IA Section 8.2, GDRCo has a comprehensive pre-transaction "Notice Approval Record" which provides a routing and approval format for all real property transactions resulting in a change in the Plan Area. GDRCo has an internal policy that the employee responsible for negotiating a proposed transaction involving the acquisition or disposal of land or timber harvesting rights within the Plan Area also is responsible for addressing the effect of the transaction on the AHCP Plan Area and preparation of a pre-transaction notice letter to the Services. Prior to submission of the pre-transaction notification letter, approval is obtained from the Vice President of Green Diamond's California Timberlands Division if the transaction will result in an addition or deletion of Plan Area acres. This notification and approval record provides assurances that the transaction is properly identified as a specific real property transaction and that the required information is documented and submitted to the Services as well as key GDRCo employees. This notification and approval record also ensures that changes to the Plan Area are recorded in GDRCo's Forest Resources Information System (FRIS), which is used to track and report Plan Area changes. Each notification to the Services provides GDRCo's best estimate of the acreage involved in the transaction and the resulting change in the Plan Area. However, the Company relies on FRIS as the official record for calculating, tracking, and reporting Plan Area changes.

The following is a list of transactions that occurred during this reporting period:

a) Gavin
b) Meyers
c) Grundman
d) Kahn

e) Trinidad-California LLC
f) Del Ponte
g) Raymond
h) Kriger
i) Cookson Ranch
j) Aquirre & Williamson
k) Ruygrok
l) Tromble
m) Macatiag
n) Ennes
o) Ede
p) Wakeman

The results of these transactions on the Plan Area and the 15% cumulative net expansion or contraction limit are provided in Section III.C. below.

B. Land Transactions

1. Plan Area Additions

Section 11.2 of the IA, stipulates that pre-transaction notice letters will be sent to the Services for any acquisition within the Eligible Plan Area that will result in an addition to the Plan Area with a description of the proposed transaction and an assessment of how the transaction will affect the AHCP. Green Diamond will provide any such notices to the Services, which will be approved and result in an automatic addition to the Plan Area unless the Services object within 60 days of notification or the addition would exceed the Plan Area adjustment limits described below. Each notification to the Services provides GDRCo's best estimate of the acreage involved in the acquisition. However, the Company relies on FRIS as the official record for calculating, tracking, and reporting Plan Area changes.

2. Plan Area Deletions

Section 11.3 of the IA provides that any deletion from the Plan Area will be automatically accepted upon notice to the Services unless the deletion would exceed the Plan Area adjustment limits described below or GDRCo seeks special consideration for the Plan Area deletion so that it is not counted against the Plan Area adjustment limits.

3. Limitations on Plan Area Transactions

As described in Section 11 of the IA, the Plan Area may not expand or contract by more than 15% of the Initial Plan Area (406,962 acres) without an amendment to the AHCP or Permits. Green Diamond may purchase and divest properties without amending the AHCP as long as the cumulative net acreage effect does not result in a Plan Area increase or decrease of more than 61,044 acres.

There are exceptions and qualifiers related to this general limitation outlined in Section 11 of the IA. Section 11.3 of the IA requires a pre-transaction notice and determination by the Services in instances where GDRCo will remove covered lands or timber harvesting rights from the Plan Area and GDRCo seeks confirmation that the deletion from the Plan Area will not be counted against the cumulative net acreage change in the Plan Area because the Services find that the new owner will manage the transferred property under enforceable conditions that will not compromise the effectiveness of the AHCP. In these instances, GDRCo will provide the Services with a pre-transaction notice that includes a justification for the exemption and GDRCo's best estimate of the acreage involved in the transaction and the resulting change in the Plan Area. The Services will provide GDRCo with a response and GDRCo will ensure that the Plan Area adjustment is accurately recorded in FRIS as a change in the Plan Area that does or does not count against the limitation on the cumulative net increase or decrease in the Plan Area.

4. Minor Modifications to the Plan Area

Under IA Section 12.1, Minor Modifications to the Plan Area may occur due to ownership acreage corrections that are not associated with a real property transaction. An example of these minor adjustments are property line boundary changes that integrate real world coordinate information from recent land surveys into the GIS system and correcting the location of property lines accordingly. Another example would be a mapping error correction identified during routine GIS work. The Initial Plan Area (406,962 acres) will be used for the duration of the AHCP Period to calculate the 15% cumulative, net expansion or contraction limitations based on transactions, but Minor Modifications will not change the Initial Plan Area in that they are, by definition, minor and would not affect operations under the AHCP or the Covered Species.

These minor acreage adjustments can fluctuate up or down during any one year and during the term of the AHCP, therefore GDRCo will identify and account for these specific adjustments using FRIS. This biennial report serves as the notification to the Services of these Minor Modifications to the Plan Area. A summary of the Minor Modifications to the Plan Area such as property line boundary changes and GIS corrections are provided in Table 12 below.

C. Summary of Land Transactions and Plan Area Adjustments

The current AHCP Plan Area consists of 359,446 acres (Table 12). As a result of Plan Area additions, deletions and minor modifications that occurred from January 1, 2021 through December 31, 2022 there was an increase of 852 acres to the current Plan Area reported in the 7th Biennial Report. Since the approval date of the AHCP, there has been a decrease of 47,516 acres in the AHCP Plan Area, with a net contraction of 24,770 acres due to non-comparable transferee transactions. The remaining decrease in acreage is accounted for in land transactions with comparable transferees as well as minor modifications to the Plan Area.

Table 12. Summary of land transactions and minor modifications that occurred between January 1, 2021 and December 31, 2022.

Property Transactions	Does the Transaction Affect the Plan Area?	Direction of Plan Area Change (+ / - / None)	GIS Transaction Area (Acres)	Plan Area Adjustment (Acres)	Does the Transaction Affect the 15% Limit?
Plan Area Additions					
Gavin (a)	Yes	(+)	3.3	3.3	Yes
Meyers (b)	Yes	(+)	15.1	15.1	Yes
Grundman (c)	Yes	(+)	203.8	203.8	Yes
Kahn (d)	Yes	(+)	292.3	292.3	Yes
Trinidad-California LLC (e)	Yes	(+)	369.9	369.9	Yes
Del Ponte (f)	Yes	(+)	66.2	66.2	Yes
Total			**950.6**	**950.6**	
Plan Area Deletions					
Raymond (g)	Yes	(-)	20.3	-20.3	Yes
Kriger (h)	Yes	(-)	0.8	-0.8	Yes
Cookson Ranch (i)	Yes	(-)	0.1	-0.1	Yes
Aguirre & Williamson (j)	Yes	(-)	6.5	-6.5	Yes
Ruygrok (k)	Yes	(-)	18.5	-18.5	Yes
Tromble (l)	Yes	(-)	15.2	-15.2	Yes
Macatiag (m)	Yes	(-)	26.6	-26.6	Yes
Ennes (n)	Yes	(-)	1.0	-1.0	Yes
Ede (o)	Yes	(-)	3.9	-3.9	Yes
Wakeman (p)	Yes	(-)	1.9	-1.9	Yes
Total			**94.7**	**-94.7**	
Minor Modifications					
Other decreases (q)	Yes	(-)	3.3	-3.3	No
			Total	**852.5**	

	Total (Acres)
Initial Plan Area	406,962
Current Plan Area (as of 12/31/2022) (r)	359,446
15% of Initial Plan Area (s)	61,044
Net Expansion (+) / Contraction (-) Acreage	-24,770

(a) Notice of the Gavin transaction was provided to the Services in a letter dated February 21, 2022. The transaction included the purchase of commercial timberland in fee.
(b) Notice of the Meyers transaction was provided to the Services in a letter dated February 21, 2022. The transaction included the purchase of commercial timberland in fee.
(c) Notice of the Grundman transaction was provided to the Services in a letter dated July 7, 2022. The transaction included the purchase of commercial timberland in fee.
(d) Notice of the Kahn transaction was provided to the Services in a letter dated July 7, 2022. The transaction included the purchase of commercial timberland in fee.
(e) Notice of the Trinidad-California LLC transaction was provided to the Services in a letter dated August 9, 2022. The transaction included the purchase of commercial timberland in fee.
(f) Notice of the Del Pote transaction was provided to the Services in a letter dated January 4, 2023. The transaction included the purchase of commercial timberland in fee.
(g) Notice of the Raymond transaction was provided to the Services in a letter dated February 18, 2021. The transaction included the transfer of real property to Raymond.

(h) Notice of the Kriger transaction was provided to the Services in a letter dated February 25, 2021. The transaction included the transfer of real property to Kriger.
(i) Notice of the Cookson Ranch transaction was provided to the Services in a letter dated February 25, 2021. The transaction included the transfer of real property to Cookson Ranch.
(j) Notice of the Aguirre & Williamson transaction was provided to the Services in a letter dated April 30, 2021. The transaction included the transfer of real property to Aguirre & Williamson.
(k) Notice of the Ruygrok transaction was provided to the Services in a letter dated April 30, 2021. The transaction included the transfer of real property to Ruygrok.
(l) Notice of the Tromble transaction was provided to the Services in a letter dated April 30, 2021. The transaction included the transfer of real property to Tromble.
(m) Notice of the Macatiag transaction was provided to the Services in a letter dated August 5, 2021. The transaction included the transfer of real property to Macatiag.
(n) Notice of the Ennes transaction was provided to the Services in a letter dated August 5, 2021. The transaction included the transfer of real property to Ennes.
(o) Notice of the Ede transaction was provided to the Services in a letter dated September 13, 2021. The transaction included the transfer of real property to Ede.
(p) Notice of the Wakeman transaction was provided to the Services in a letter dated December 6, 2021. The transaction included the transfer of real property to Wakeman.
(q) Minor Modifications resulted in a net decrease in the Plan Area due to property surveys and GIS upgrades.
(r) Reported acreage adjustments to the Initial Plan Area are rounded to the nearest whole acre.
(s) The expansion or contraction limit relative to the Initial Plan Area (406,962 acres) without an amendment to the Plan or Permits. There are exceptions and qualifiers related to this limitation outlined in Section 11 of the IA.

IV. AHCP Training Programs

As specified in AHCP Section 6.2.3.14, training is required for all company and contract equipment operators and supervisors involved with the Road Implementation Plan along with RPFs and forestry technicians involved with road design, layout and development of road treatment prescriptions. The training is offered annually as necessary for new employees or new contractors. Refresher training courses on the Road Management Plan are provided as needed to review concepts, introduce any new state-of-the-art techniques, and to present any new relevant regulatory information.
As specified in AHCP Section 6.2.2.5, training will be administered by a qualified PG or CEG to all RPFs that write THPs to review issues related to the AHCP Slope Stability Measures. The purpose of the training is to help RPFs identify and more fully understand the slope stability measures as well as the possible implications of various timber management scenarios for landslides and other unstable areas. The training is offered annually to accommodate new contractors and new employees. Refresher training courses are provided as necessary to employees and contractors to present new relevant scientific or regulatory information.

A. 2021 Training Programs

Due to the COVID-19 pandemic, the annual contractors’ breakfast meeting was not held in 2021. As in 2020, GDRCo employees met on several days with individual contractors during the late spring of 2021 to review the content of the training binder which contains general company safety procedures as well as HCP training materials that we typically review collectively at the breakfast meeting. The standard road related topics we review are road cost tracking, water drafting and general road treatment procedures. The company Professional Geologist conducted 4 trainings in 2021 covering worker safety when conducting road activities in areas proximal to rock types containing asbestos and general forest geology topics. Table 13 summarizes the AHCP related training programs held in 2021.

Table 13. Summary of 2021 training programs.

Training Dates	Groups	AHCP Orientation and Geologic Training	AHCP Updates and Geologic Training	General Road Manageme nt Measures	Road Design and Layout	Road Upgrading, Decommissioning, Maintenance, and Construction Standards
Late Spring	Contract operators	X		X	X	X
July 21	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
Aug 25	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
Oct 31	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
Dec 13	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			

B. 2022 Training Programs

Due to continued Covid-19 protocols and the departure of the AHCP Roads Supervisor, the contractor breakfast was not held in 2022. GDRCo employees met on several days with individual contractors during the spring of 2022 to review the content of the training binder which contains general company safety procedures as well as HCP training materials that we typically review collectively at the breakfast meeting. The standard road related topics we review are road cost tracking, water drafting and general road treatment procedures. The company Professional Geologist conducted 5 trainings in 2022 covering worker safety when conducting road activities in areas proximal to rock types containing asbestos and general forest geology topics. Additionally, an AHCP training document was distributed to the Forestry and Operations departments on May 12, 2022. The training document was reviewed by both Klamath and Korbel forestry and operations company employees in May and June of 2022. The document contains the AHCP Road Management Measures, an overview of the MATO, an overview of the Road Management WDR, water rights compliance measures, the Imminent Risk of Failure intent document, examples of road-related sediment delivery issues and treatments, as well as supporting documents with excerpts from the AHCP and MATO. The forestry department held a road design and layout training on 18 April 2022 with field and office components. Table 14 summarizes the AHCP related training programs held in 2022.

Table 14. Summary of 2022 training programs.

Training Dates	Groups	AHCP Orientation and Geologic Training	AHCP Updates and Geologic Training	General Road Management Measures	Road Design and Layout	Road Upgrading, Decommissioning, Maintenance, and Construction Standards
Spring	Contract operators	X		X	X	X
Feb 11	Operations			X		X
Feb 23	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
March 28	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
May 25	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
June 2	Operations	X	X	X	X	X
Aug 2	Operations			X		X
Sept 14	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			
Nov 30	Company supervisors, employees, RPFs, forestry technicians, operations	X	X			

V. Road Management Measures

The principal purpose of the Road Management Measures (AHCP Section 6.2.3) is to eliminate major sources of sediment discharges into watercourses from roads. The objective of the Road Implementation Plan (AHCP Section 6.2.3.2) is to carry out a systematic road upgrade and decommissioning program using the Plan's road assessment and prioritization system (AHCP Section 6.2.3.1) that will maximize sediment reduction and conservation benefits within the Plan Area for the Covered Species. To achieve additional conservation benefits from this effort, the Road Implementation Plan had an acceleration period for the first 13.5 years of the Plan; GDRCo provided for an average of $2.5 million (inflation adjusted to 2002 dollars) each year of the acceleration period to carry out the upgrade and decommissioning program. The acceleration period ended in 2020 and GDRCo is no longer required to provide a specific annual amount towards the Road Implementation Plan. The work to be done and the sediment savings to be achieved by the Road Implementation Plan are tied to the results of the Road Assessment Process. The main objective of the Road Maintenance Program (AHCP Section 6.2.3.9) is to ensure that the sediment saving conservation benefits of the road upgrading program are maintained throughout the life of the Plan after the roads are upgraded.

A. Programmatic Road Permits

On June 10, 2010, NCRWQCB adopted Road Management Waste Discharge Requirements (RMWDR: Order No. R1-2010-0044) and on June 15, 2010, CDFW issued a Master Agreement for Timber Operations (MATO: No. 1600-2010-0114-R1) that would allow GDRCo to conduct road activities related to the AHCP Road Implementation Plan and the Road Maintenance and Inspection Program. These agreements allow GDRCo to notify CDFW and NCRWQCB of all planned watercourse crossing activities on an annual basis through a report (Annual Work Plan). There is an initial 60-day review period, with methods to revise and update the plan throughout the operating season.

The acquisition of the programmatic permits also significantly changed the approach to assessing roads for THPs. Prior to acquiring the permits, roads were assessed and treated according to the “fully functional” concept per THP. This concept forced mitigation efforts and treatment on a wide spectrum of issues and sediment introduction risk levels including diversion potential, presence of erosion, blockages of inlets and outlets, lack of hydrological disconnection and pipe integrity, for example. Through discussions with NMFS, USFWS, CDFW, NCRWQCB and CalFire a streamlined approach to road assessment was developed, approved, and is implemented as part of the programmatic permits. The “Imminent Risk of Failure” concept, as it is referred to, uses six general elements of watercourse crossings within a decision tree to guide road assessment. The assessor follows this decision tree to conclude whether a crossing should be upgraded or decommissioned, monitored or deferred for mitigation. The primary reason for this new approach is to focus mitigation efforts on sites which have the highest potential risk for failure or significant sediment delivery in a property-wide approach rather than on a THP-by-THP basis, and also, to utilize and fully implement the Routine Road Maintenance and Inspection Plan set forth in AHCP Section 6.2.3.9.

During 2010, the first year of implementing the “Imminent Risk of Failure” concept, issues arose during pre-harvest inspections. The primary issue was related to interpretation of the decision tree during assessment of crossings. These interpretations varied from the determinations made by Forest Operations Technicians responsible for completing road work orders in THPs and the agency representatives who inspect the THPs for consistency and regulatory compliance. As a result of these issues, an intent document was created which discussed each section of the key including a description of the issue, diagnosis of issues and what appropriate mitigation measures to apply. This intent document was circulated within GDRCo, CalFire, CDFW and NCRWQCB for input and suggested revisions. Once the document was finalized it was distributed to GDRCo staff and all field agency representatives to help establish a consistent evaluation and interpretation of road related mitigation measures. Since this distribution issues during pre-harvest inspections have been minimized. The intent document will be revised as needed to reflect new techniques and issues as they arise over time.

The 2021 Annual Work Plan included road sites for 51 THPs, 57 sites related to Routine Maintenance Area #3 and Terwer Creek Road Work Unit, 11 sites related to emergency salvage operations outside the AHCP covered plan area, 1 Stream and Floodplain Enhancement grant project in Upper McGarvey Creek, 10 revisions to enrolled THP sites, and 1 water drafting site. The 2022 Annual Work Plan included road sites for 33 THPs, 10 sites related to Routine Maintenance Area #3, 1 site related to the Terwer Creek Road Work Unit, 8 sites related to routine mainline road maintenance, and 1 Beaver Dam Analogue Stewardship and Enhancement project in McGarvey Creek, 1 revision to an enrolled THP, and 1 Wet/Dry Class I Fording Site.

B. Road Assessment Process

Road assessments are conducted using a standardized protocol which addresses site priority and volume of potential sediment delivery. Site priority is assigned based on volume of potential sediment delivery, treatment immediacy and overall cost-effectiveness of the proposed treatment. Volume of potential sediment delivery is calculated using a systematic approach of cross-sectional analysis of stream crossing fill prisms. The “Imminent Risk of Failure” concept has also allowed an even greater level of standardization as well as consistent treatment prescriptions in THPs and work required within the Routine Maintenance Areas and for mainline roads.

In 2009, GDRCo successfully completed the consolidation of all previous road assessments into a single, useable database. Database reporting tools were added to the database which allows the AHCP Roads Coordinator to analyze and publish data to support other AHCP working groups, operational staff and various regulatory requirements. In 2011, a project was completed to increase the accuracy of the spatial database link through the process of correcting GIS points to LiDAR-corrected road and stream data as well as digitizing data from paper maps. Further refinements to the database were completed in 2014 to increase speed and incorporate new tools to allow for more accurate and time saving processes. No significant changes to the road data in TMIS are planned in the future.

The fundamental processes of AHCP Section 6.2.3.1 are to have qualified personnel accurately identify road-related erosion sites and apply a prioritized treatment. The transition from RPFs conducting road assessments to the AHCP Roads department conducting the assessments was completed in early 2009. Presently, Forest Operations Technicians assess all THPs within the AHCP Plan Area to ensure consistency and compliance with all requirements in AHCP Section 6.2.3. In addition, they attend PHIs and assist RPFs, as necessary, during the THP review process. Consolidating and coordinating the road assessment process through the AHCP Roads department has helped ensure consistency between THPs, efficient calculations of required statistics, accurate operational planning and compliance with AHCP, WDR and MATO standards.

As mentioned above GDRCo obtained programmatic road permits from CDFW and the NCRWQCB to conduct road-related activities associated with the AHCP Road Management Plan. Assessment and road treatment work to date has occurred coincident with THP activities and within the Routine Maintenance Areas associated with the Routine Road Maintenance and Inspection Plan

(AHCP Section 6.2.3.9). This effort has allowed GDRCo to implement the "Imminent Risk of Failure" concept described above and focuses resources on sites that have the highest potential risk for failure.

C. Road Implementation Plan

The Road Implementation Plan (AHCP Section 6.2.3.2) is the natural extension and completion of a process GDRCo started in 2001 to address sediment-related issues associated with roads on the Plan Area landscape. Beginning in 2000, State agencies involved with reviewing THPs began mandating substantial road improvements on appurtenant haul routes. These road upgrading activities mirror the type of upgrading requirements that were adopted and included within the AHCP and became one of the AHCP's focal points.

During the 2011 Annual Meeting, the Services requested that GDRCo provide a summary of road work in the biennial reports that distinguishes between sites that were completed in conjunction with THP operations and those sites that were completed outside the THP process (e.g. non-THP maintenance activities and grant-related activities). Table 15 summarizes these data for 2021 and 2022.

Table 16 summarizes the number of sites and volume of sediment associated with treating high and moderate priority sites, for each operating area, from 2007 through 2022. Maps are also included that show the locations of the high and moderate priority sites that were treated from 2007 through 2022 (Figures 1-6). AHCP Section 6.2.3.2 required GDRCo to provide for an average of $2.5 million (inflation adjusted in 2002 dollars) per year during the acceleration period. GDRCo utilizes the GDP Price Index to adjust for inflation because it provides a broader measure of inflation that is not as consumer focused as the Consumer Price Index. In addition, there are multiple sources that provide multiple year forecasts of the GDP Price Index until the official values are published by the Bureau of Economic Analysis. Reliable forecasts of the GDP Price Index are critical to ensure that GDRCo is on track to spend the appropriate average annual amount of money because the true inflation rates are not published until the following year. As of the 7th biennial report in 2021, the inflation rate for 2020 was not available. Table 17 has included the actual inflation rate for 2020 and displays that the appropriate amount of money was spent by GDRCo. Since the acceleration period ended in 2020, Table 17 will no longer be presented after this 8th Biennial Report.

AHCP Section 6.2.3.2.1 #4 and IA Section 7.2 requires GDRCo to adjust the annual commitment proportionally with changes in the Plan Area in relation to the acreage of the Initial Plan Area. Table 12 summarizes all the land transactions and minor modifications which occurred in 2021 and 2022. The current Plan Area, as of December 31, 2022 is 363,541 acres which is 89.3% of the Initial Plan Area of 406,962 acres (see Section III.B). Based on these Plan Area adjustments, the $2,500,000 annual spending requirements (in 2002 dollars) were proportionally adjusted each year by the proportional changes in Plan Area beginning in 2012 (see Table 17).

Table 15. Summary of the number of sites and volume of sediment savings from treating high and moderate priority sites, by operating area, from 2021 through 2022.

Year	Metric	Korbel THP(1)	Klamath THP(2)	Korbel Non-THP(3)	Klamath Non-THP(4)	Korbel GDRCo Grant Contribution(5)	Korbel Grant Sources(6)	Klamath GDRCo Grant Contribution(7)	Klamath Grant Sources(8)	Total
2021	Number of Sites	90	131	28	17	-	-	-	-	266
2021	Volume (cu. Yds.)	16,258	32,003	46,063	7,788	-	-	-	-	102,112
2022	Number of Sites	85	53	10	6	-	-	-	-	154
2022	Volume (cu. Yds.)	16,902	5,123	1,764	781	-	-	-	-	24,570
2021-2022	Number of Sites	175	184	38	23	-	-	-	-	420
2021-2022	Volume (cu. Yds.)	33,160	37,126	47,827	8,569	-	-	-	-	126,682

1 THP related road sites within the Korbel operating area which is the geographical area south of the Bald Hills Road which intersects

2 THP-related road sites within the Klamath operating area which is the geographical area north of Bald Hills Road which intersects

3 Non-THP related road work for Routine Maintenance Area #3 and mainline roads within the Korbel operating area. No grant

4 Non-THP related road work for Routine Maintenance Area #3 and mainline roads within the Klamath operating area. No grant

5 Dollars GDRCo provided for as direct cost share (cash) to grant-related projects in the Korbel operating area.

6 Funding for grant-related road work within the Korbel operating area with sources from the Fisheries Restoration Grant Program

7 Dollars GDRCo provided for as direct cost share (cash) to grant-related projects in the Klamath operating area.

8 Funding for grant-related road work within the Klamath operating area with sources from the Fisheries Restoration Grant Program

Table 16. Summary of the number of sites and volume of sediment savings from treating high and moderate priority sites, from 2007 through 2022.

Year	Metric	Korbel[1]	Klamath[2]	Total
2007-2020	Number of Sites	2,150	1,576	3,726
2007-2020	Volume (cu. Yds.)	580,208	642,214	1,222,422
2021-2022	Number of Sites	213	207	420
2021-2022	Volume (cu. Yds.)	80,987	45,695	126,682
2007-2022	Number of Sites	2,363	1,783	4,146
2007-2022	Volume (cu. Yds.)	661,195	687,909	1,349,104

[1] Korbel operating area is the geographical area south of the Bald Hills Road which intersects Highway 101 at Orick.

[2] Klamath operating area is the geographical area north of Bald Hills Road which intersects Highway 101 at Orick.

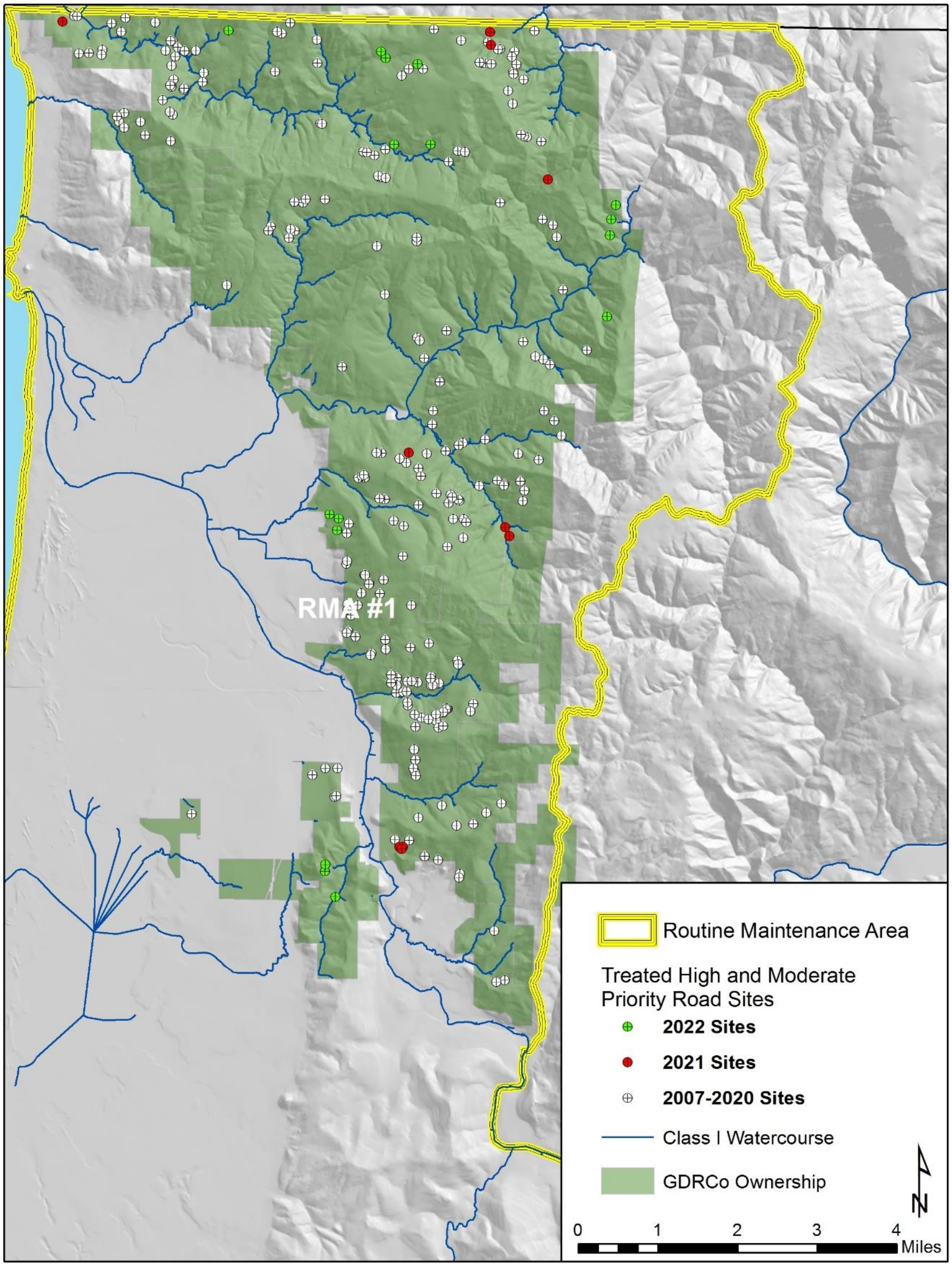

Figure 1. Location of High and Moderate priority road sites treated from 2007-2022 in the Smith River area.

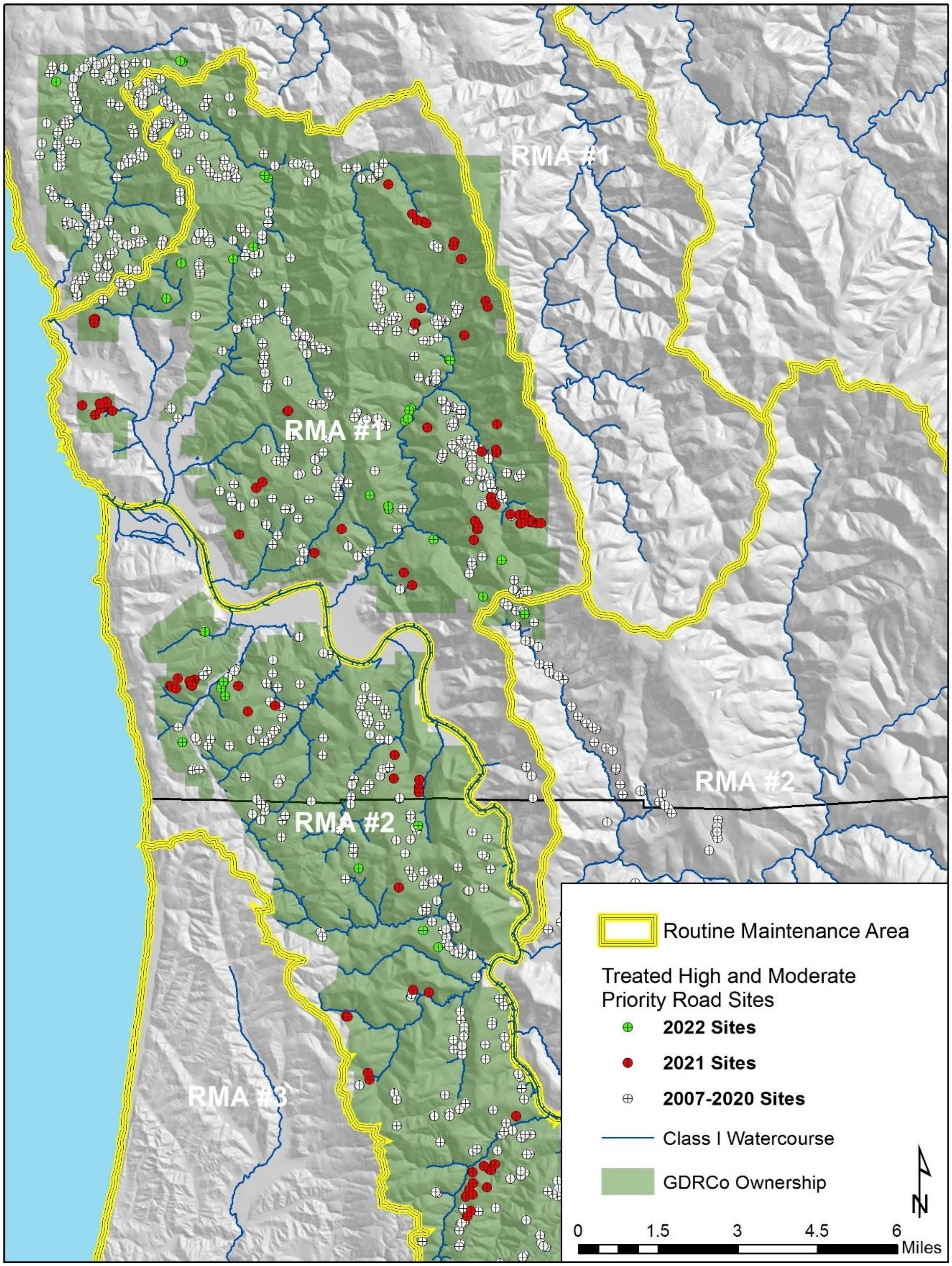

Figure 2. Location of High and Moderate priority road sites treated from 2007-2022 in the Coastal Klamath area.

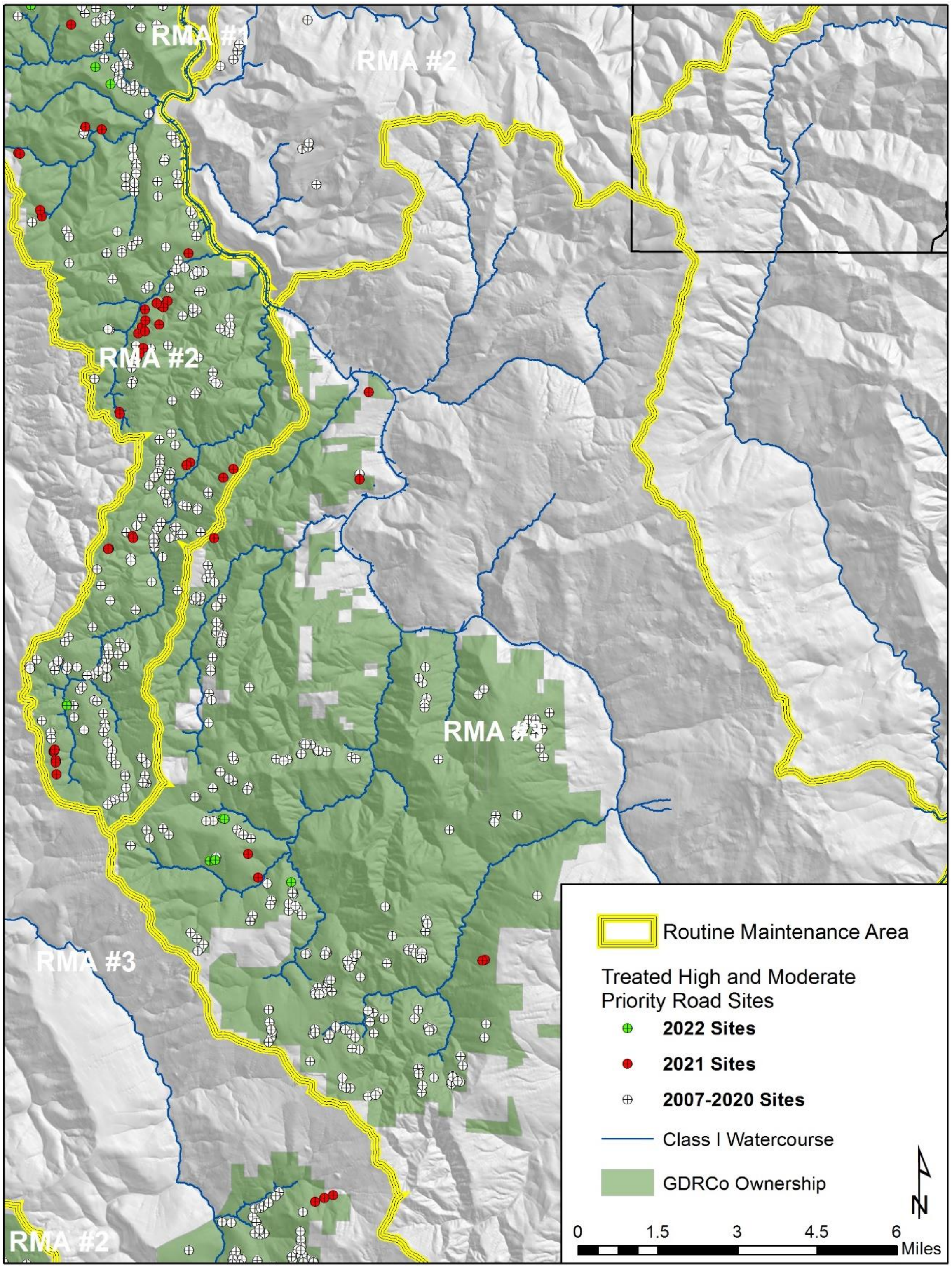

Figure 3. Location of High and Moderate priority road sites treated from 2007-2022 in the Interior Klamath area.

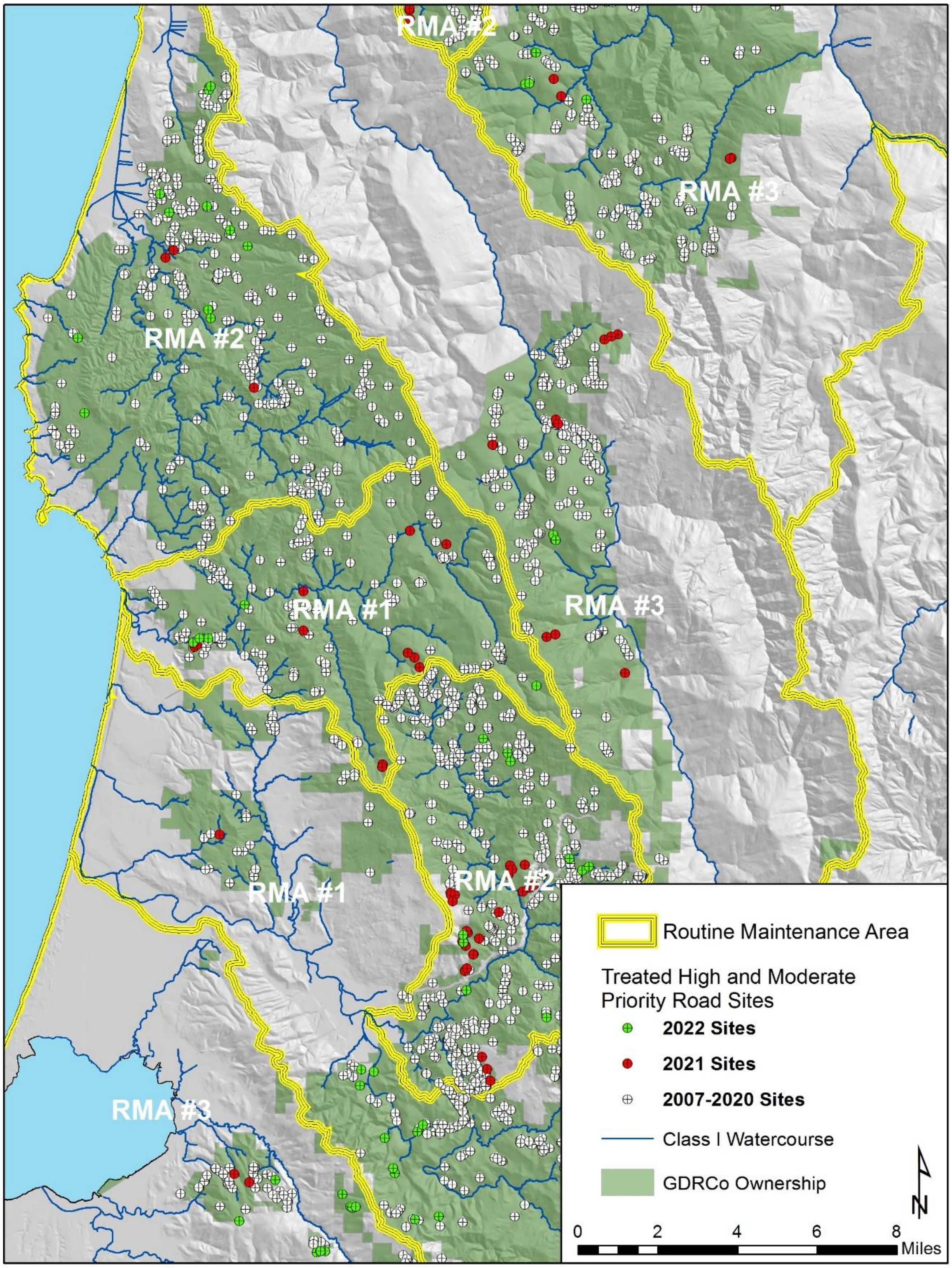

Figure 4. Location of High and Moderate priority road sites treated from 2007-2022 in the Maple Creek, Little River and Lower Mad River areas.

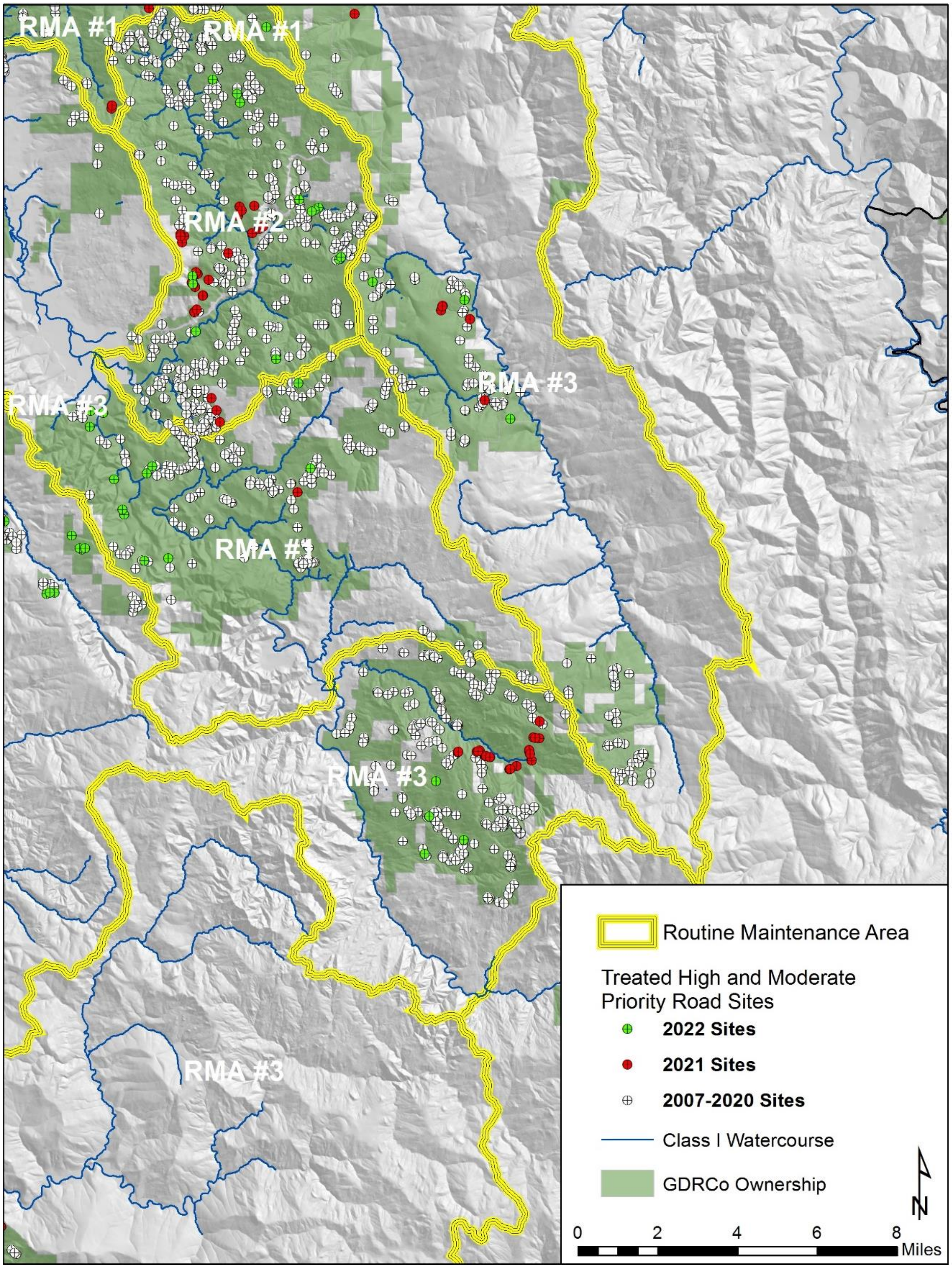

Figure 5. Location of High and Moderate priority road sites treated from 2007-2022 in the Mad River area.

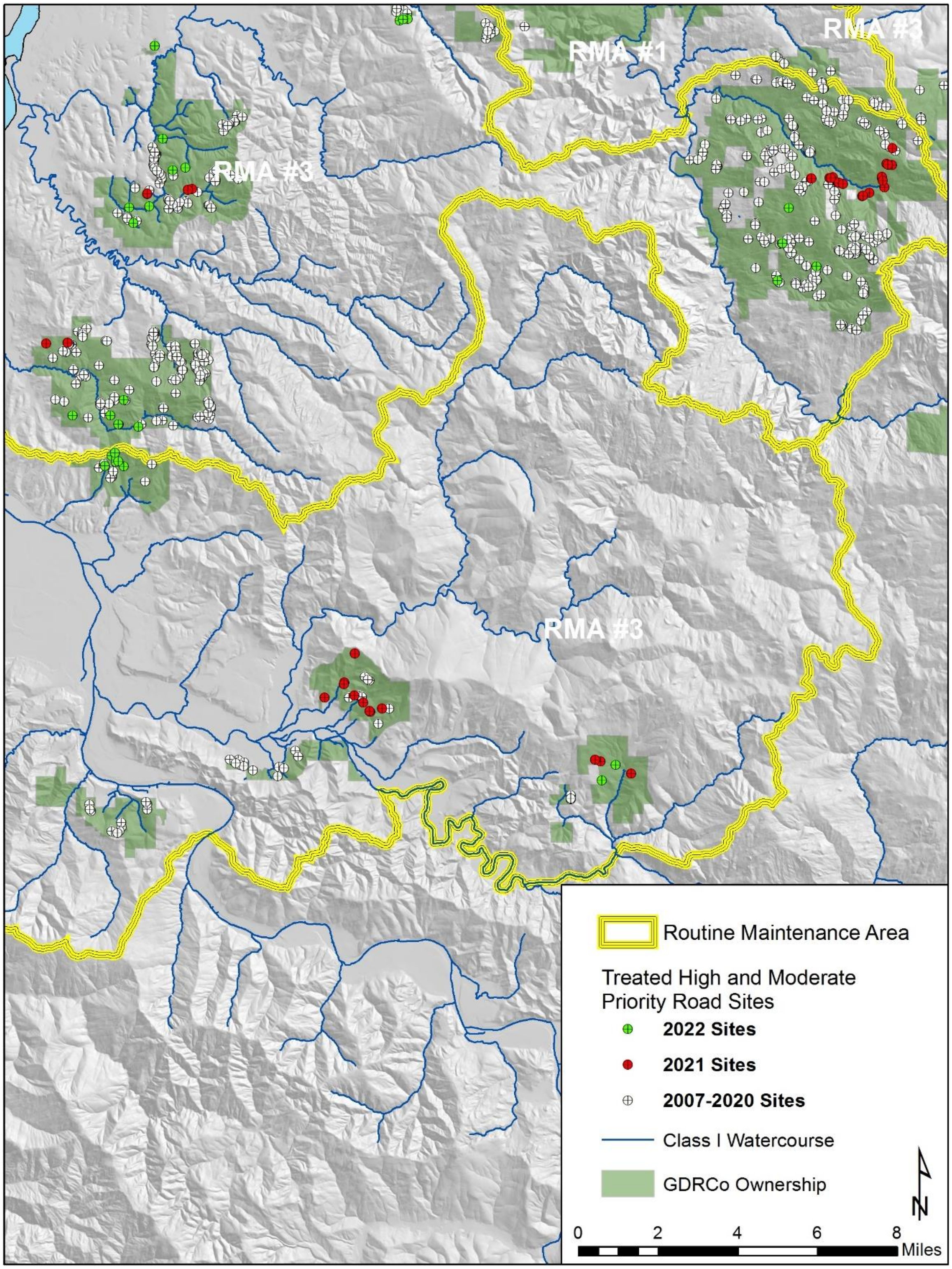

Figure 6. Location of High and Moderate priority road sites treated from 2007-2022 in the Humboldt Bay and Eel River areas.

AHCP Section 6.2.3.2.2 required an assessment of future sediment yields at the end of the first five-year period (Five-year Assessment of Future Sediment Yield). The intent of this assessment from the AHCP was to evaluate and potentially revise the preliminary estimated sediment savings of 6,440,000 cubic yards from treating high and moderate priority road sites. The results of this study were submitted to the Services on December 20, 2013 per AHCP Section 6.2.3.2.3. The letter submitted to the Services with the complete results was included in the 4th AHCP Biennial Report (GDRCo 2015). The results of this study indicated the refined estimate is 30.5% less than the original estimate which exceeded the maximum allowed reduction for the Acceleration Period; therefore, the Acceleration Period was reduced by 1.5 years (the maximum adjustment allowed) with a corresponding spending reduction of $3.75 million. To reflect this result, the Acceleration Period was revised to 13.5 years with $33.75 million (to be inflation adjusted in 2002 dollars for each year of the acceleration period) provided for by GDRCo over this period.

Based on the annual property transactions that have occurred since the beginning of the AHCP, the target spending requirement has also been reduced to $31.35 million (to be inflation adjusted in 2002 dollars). Accounting for inflation, the target spending in real dollars is $40.02 million. As shown in Table 17, the total amount that GDRCo has provided for through 2020 is $40.276 million; therefore, GDRCo met the spending requirement in year 13 of the 13.5 year Acceleration Period. With the Acceleration Period spending requirement being met in 2020 rather than in 2021, there is no longer an average annual spending target or need to forecast or report the annual road expenditures for high or moderate priority road sites

D. Road Maintenance and Inspection Plan

AHCP Section 6.2.3.9 specifies the road maintenance and inspection plan. The Services approved a minor modification of the schedule for the Routine Maintenance Areas (RMAs) as well as the schedule for mainline roads (See Section II.D.3.) Road inspections were conducted in accordance with the process outlined in AHCP Section 6.2.3.9.5 and the approved minor modifications. The rotating annual schedule of RMAs are defined in distinct sections covering the entire Plan Area. The maintenance assessment was separated into a two-tier approach. The AHCP Roads Department was responsible for surveying the non-appurtenant roads and the Operations department was responsible for surveying the roads appurtenant to THPs.

Table 17. Actual Gross Domestic Product (GDP) Price Index inflation rates published by the Bureau of Economic Analysis including actual expenditures by year for treating high and moderate priority road sites during the acceleration period, 2007-2020.

	Base	Actual [1]														
Year	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
GDP Price Index (% change from preceeding period)	0.00%	2.71%	1.88%	0.66%	1.21%	2.07%	1.88%	1.77%	1.86%	0.96%	1.00%	1.93%	2.40%	1.77%	1.30%	
Cumulative Inflation Rate (2002 Base)	0.00%	14.37%	16.52%	17.29%	18.70%	21.16%	23.44%	25.62%	27.96%	29.19%	30.48%	32.99%	36.18%	38.59%	40.40%	
																Totals
Required Average Annual Spending in 2002 $ ($MM)		$ 0 [2][3]	$2.50	$2.50	$2.50	$2.50	$2.36 [4]	$2.30 [4]	$2.97 [4]	$2.25 [4]	$2.25 [4]	$2.20 [4]	$2.20 [4]	$2.20 [4]	$2.20 [4]	$30.93
Required Average Annual Spending After Adjusting for Inflation Using 2002 as Base ($MM)		$ 0	$2.91 [5]	$2.93	$2.96	$3.03	$2.91	$2.89	$2.94	$2.91	$2.93	$2.92	$2.99	$3.05	$3.09	$35.55
Actual and Budgeted Spending by year ($MM)		$1.676	$4.073	$1.171	$2.179	$4.710	$3.966	$3.346	$3.468	$3.396	$2.336	$1.910	$1.914	$2.480	$3.650	$40.276

(1) The Bureau of Economic Analysis has revised the "Actual" GDP Price Index values that were reported in the last Biennial Report (See page 1-7 in the following methodology paper: http://www.bea.gov/national/pdf/NIPAch1-4.pdf).

(2) Reflects the AHCP Minor Modification to the acceleration period to have funds be measured on a calendar year

(3) Reflects the AHCP Minor Modification to the acceleration period to have funds provided for the 3-year ramp-up period begin on the effective date of the Plan through the end of the third calendar year.

(4) Reflects the revised annual spending requirement based in the proportional adjustment in the current Plan Area in relation to the Initial Plan Area, as per IA Section 7.2 and AHCP Section 6.2.3.2.1 #4.

(5) Beginning $2.5MM at 2002 base inflation.

During the winters of 2021 and 2022 inspections of the appurtenant roads (including mainline and secondary roads) were conducted by the Operations department. These inspections were focused on identification and treatment of “active erosion sites” and others related to compliance with California Forest Practice rules and the AHCP. Any sites identified for treatment were scheduled and completed by the Operations department. During the summer of 2021 and the spring of 2022 Forest Operations Technicians surveyed mainline roads and appurtenant roads associated with THP development.

Assessment of RMA #3 began in 2020 and was completed in 2021. This area consists of the Interior Klamath HPA, the Redwood Creek HPA, the Humboldt Bay HPA and Boulder Creek RWU, and the Eel River HPA. All sites associated with RMA #3 were included in the 2021 Annual Work Plan and are expected to be completed by October 2023. Assessment of RMA #1 began in late 2022 and continues in 2023. Sites associated with RMA #1 will be permitted in the 2023 Annual Work Plan and are expected to be completed by October 2025. Assessment of the Wilson Creek RWU and Tectah Creek RWU began in 2022 and continues in 2023.

VI. Geology

The AHCP requires GDRCo to conduct several geologic assessments across the Plan Area. The following discussion summarizes these individual projects.

A. CMZ/Floodplain Delineation

Green Diamond revised the CMZ/Floodplain Delineation project through a minor modification submitted in March of 2011. Since that time GDRCo has completed the CMZ/Floodplain mapping concurrent with THP development throughout the life of the ITP and ESP Permits. A summary of CMZ’s and Floodplains delineated during the current reporting period is shown in Section II. F.

B. SSS Delineation Plan (AHCP Section 6.2.5.3.2)

Steep Streamside Slope’s (SSS) are a default mass wasting prescription that are applied to steep slopes directly adjacent to Class I and Class II watercourses on GDRCo timberlands. These areas vary in size, depending on slope gradients, and are thought to require the retention of more timber than a Riparian Management Zone.

The stated goal of the SSS prescription is to achieve a 70 percent reduction of landslide volumes delivering to watercourses in comparison to historical management related landslide volumes. The original AHCP contained initial default prescriptions that GDRCo applied to qualifying SSS. In December of 2014 GDRCo completed the SSS Delineation Study (see AHCP Section 6.2.3.5.2 that modified the initial SSS default prescriptions across the property. A copy of the final SSS Delineation Study was included in the 4th AHCP Biennial Report (GDRCo 2015).

C. SSS Assessment (AHCP Section 6.2.5.3.3)

As described above, Steep Streamside Slopes are a mass wasting prescription that was developed specifically for GDRCo lands. The prescription was developed through a landslide study for GDRCo's AHCP. The proposed goal of the SSS prescription is to achieve a 70 percent reduction in sediment associated with shallow landslide volumes delivering to watercourses in comparison with historical landslide volumes associated with historically clearcut slopes about the referenced areas of the AHCP. With the proposed SSS Assessment we will attempt to determine the effectiveness of the default SSS prescriptions across the property. A scientific review panel will be assembled to analyze the resulting data. The panel will consist of a three-person team of independent experts in the field of timber management and slope stability. In July of 2014 we discussed modifications to the SSS Assessment with the Services which was described in detail in the 5th Biennial Report (GDRCo 2017).

1. Current Status of the SSS Assessment

In December of 2013 we began reviewing the SSS sample areas and one year later completed our preliminary review of all 58 SSS sample areas that total 92 acres of SSS. These areas were last reviewed in 2019. Our initial review was reported in the 4th Biennial Report (GDRCo 2015) and included a summary of four landslides. After further review of the landslide data and sample areas for this assessment we discovered an error in the classification of one of the landslides. It was determined that landslide LS8953 (found in Ryan Slough of the Humboldt Bay HPA) is not a SSS landslide. This slide was found to have initiated outside of the SSS zone adjacent to a Class III watercourse. The revised sediment delivery estimate for the three remaining landslides from 4th Biennial Report is 79 cubic yards, down from the original estimate of 87 cubic yards. One additional post-harvest landslide was found in 2017 and discussed in the 6th Biennial Report (GDRCo 2019). GDRCo continues to review the SSS sample areas. Our review of these sites in 2019 and 2020 did not reveal any new indications of post-harvest landsliding. To date, it is estimated that a combined total of 137 cubic yards of sediment has been delivered to streams associated with the SSS Assessment sample areas since 2013.

It would be inaccurate to calculate a delivery rate from the sample areas because of the difficulty in estimating an appropriate contributing landscape area. The sample areas are discrete locations identified within THPs; not at a watershed or ownership level. An attempt to calculate a rate from these data would not be directly comparable to the delivery rates reported in the preliminary Mass Wasting Assessment. Utilizing only the sample area, volume and duration of the project would grossly overestimate delivery rates and is biased to only SSS slopes which are identified as landslide prone terrain. In order to calculate comparable delivery rates, we would need to estimate the total SSS within the ownership, which is a significant GIS analysis that has not yet been conducted.

Historical sediment delivery rates were established as part of the preliminary Mass Wasting Assessment. We intend to utilize the historical landslide sediment delivery rates for comparison and evaluation of the SSS Assessment sample areas. These rates are discussed in the Preliminary Mass Wasting Assessment, which was included as Appendix B in the 5th Biennial Report (GDRCo 2017). Updates to the sediment delivery rates were made in 2022 and provide more detailed historical and contemporary rates (Woodward, 2023, article in Press). We anticipate using these revised data for preliminary evaluation of the SSS assessment data in 2024.

D. Mass Wasting Assessment (AHCP Section 6.2.5.3.4)

The goal of the Mass Wasting Assessment (MWA) is to examine the relationship between landslide processes and timber management practices. This study will be based on the collection of a thorough landslide and land use history data set. We intend to utilize, and build upon, the existing landslide and land use history data sets that are being compiled for the SSS projects. The field data from each of these projects will also be incorporated into the MWA and will also be built upon as needed. For this study we will use the aforementioned data to focus on the causal mechanisms of the various mass wasting processes we observe throughout the ownership and specifically their relationship to timber management practices. In addition, we will examine other contributing factors such as climate, bedrock geology, and structural geology.

1. Purpose and Scope of the Assessment

The purpose of the MWA is to evaluate the influence of timber management practices on Mass Wasting for each of the 11 HPAs identified in GDRCo's AHCP.

The scope of work for the assessment is generally based on the standard methodology for mass wasting analysis as defined in The State of Washington's Forest Practice Board (WSFPB) watershed analysis manual. As described above we will consider a variety of factors in this assessment followed by detailed review and therefore this study would likely fall under the criteria of a Level 2 analysis as discussed in the mass wasting section of WSFPB's watershed analysis manual. This project will be completed within 20 years from the effective date of GDRCo's AHCP (July 1, 2027).

2. Current Status

The preliminary results of the Mass Wasting Assessment were submitted to the Services and other state agencies in November of 2016. To date our data collection has focused largely on shallow landslides due to the nature of our data collection efforts being centered on the SSS Delineation and Assessment projects. Mass wasting associated with deep-seated failures will be addressed in the future and although Class III watercourses have not yet been specifically assessed for mass wasting; our preliminary data suggests that it is unlikely that there is a significant amount of mass wasting resultant sediment associated with Class III watercourses. None the less, these areas will be reviewed prior to completing the final Mass Wasting Assessment. Our preliminary data show sediment delivery and erosion rates related to shallow mass wasting have declined. Analysis of the available rainfall data appears to dismiss climatic factors as significant driving influences in this decline. However, as we acquire more detailed landslide initiation data this relationship will continue to be monitored to address any positive correlations we may find. Mass wasting associated with deep-seated failures will also be addressed in the future. During the current reporting period, Green Diamond completed preliminary deep-seated landslide mapping of several experimental watersheds and sub watersheds across the ownership. The watersheds were chosen based on their proximity to our aquatic monitoring areas to maximize our efforts. Those areas included in our mapping were Little Mill Creek, South Fork Ah Pah, Mainstem Ah Pah (above the confluence with the South Fork, Lower South Fork Little River, Upper South Fork Little River, McCloud Creek, and Ryan Creek. In the coming years we intend to review and analyze these data for the mass wasting assessment.

In conjunction with evolving forest practice rules, GDRCo has continued to reduce impacts related to management practices. Since 2000, GDRCo has made a significant effort to reduce sediment inputs and improve terrestrial and aquatic habitat by improving management practices on its own accord. These efforts include; adapting to less impactful logging (yarding) methods such as shovel yarding in early 2000 (GDRCo was the first company in northern California to do so), implementing our AHCP specific Riparian Management Zones in 2007 (which are equivalent to or exceeded the level of protection of the Forest Practice Rules), implementing our own AHCP road management measures in 2007 that hydrologically disconnect roads from streams, and, as noted above, established steep streamside slope buffers designed to reduce streamside mass wasting. It is our judgment that the reduction in shallow landslides and related erosion and sediment delivery is the result of improvements to management practices with specific attention directed to mass wasting areas of concern. A copy of the "Preliminary Mass Wasting Assessment" was provided as Appendix B in the 5th Biennial Report (GDRCo 2017).

VII. Budget

Implementation Agreement Section 8.1(b) requires GDRCo to submit a detailed budget for measures pursuant to the Operating Conservation Program that require out-of-pocket expenditure that will be implemented in each subsequent calendar year before the next biennial report is due. In previous biennial reports the planned and anticipated budgets included expenditures for road work associated with treating high and moderate sites to demonstrate compliance with the annual spending requirement for the Acceleration Period for the Road Management Plan (See AHCP Section 6.2.3.2). As described in Section V.C. above, GDRCo met the total spending requirements for the Acceleration Period in 2020 (a half year early). With the successful completion of this AHCP requirement, there is no longer an average annual spending target or need to forecast the annual road expenditures for high or moderate priority road sites. GDRCo will continue to perform road treatments across the property associated with THP activities and with implementation of the Road Maintenance and Inspection Plan associated with the AHCP; however, tracking the costs associated with these activities is no longer required. Table 18 summarizes the planned budget for implementing the monitoring requirements of the AHCP for 2023. Table 19 summarizes the anticipated budget for implementing the monitoring requirements of the AHCP for 2024. The 2023 planned budget formed the basis for projecting the anticipated 2024 budget and is therefore similar in many ways.

Table 18. Planned budget for 2023.

Item		Amount
Payroll		
Salaries		$ 1,382,475
Benefits		$ 288,598
Misc. Supplies (including fuel)		$ 129,754
Equipment Maintenance		$ 38,730
Professional Services		$ 105,000
Other Misc. Costs		$ 52,538
	Total	$ 1,997,095

Table 19. Anticipated budget for 2024.

Item		Amount
Payroll		
Salaries		$ 1,423,949
Benefits		$ 297,256
Misc. Supplies (including fuel)		$ 133,647
Equipment Maintenance		$ 39,892
Professional Services		$ 105,000
Other Misc. Costs		$ 54,114
	Total	$ 2,053,858

VIII. Effectiveness Monitoring

Effectiveness monitoring and adaptive management are key components of Green Diamond's AHCP. The AHCP sets specific biological goals and objectives related to the abundance, distribution, and habitat of the Covered Species (AHCP Section 6.1) and it defines an Operating Conservation Program intended to achieve those goals and objectives (AHCP Section 6.2). The role of the Effectiveness Monitoring Program is to track the success of the Operating Conservation Program in meeting the AHCP's biological goals and objectives, and to provide the feedback needed for adaptive management if those goals and objectives are not being met. The Effectiveness Monitoring Program is described in AHCP Sections 6.2.5 and 6.3.5, with detailed protocols included in AHCP Appendix D.

The monitoring projects and programs fall into four categories: Rapid Response Monitoring, Response Monitoring, Long-term Trend Monitoring and Research, and Experimental Watersheds Program. The first three categories are based on the minimum time frame over which feedback for adaptive management is likely to occur. The time scales are a product of the specific variables or processes being measured as well as the available monitoring protocols currently used.

The Rapid Response and Response Monitoring projects form the backbone of the adaptive management process. Each project has (or will establish) measurable thresholds which, when exceeded, initiate a series of steps for identifying appropriate management responses. To provide the ability to respond rapidly to early signs of potential problems while providing assurances that negative monitoring results will be adequately addressed, a two-stage “yellow light, red light” process is employed. The yellow light threshold serves as an early warning system to identify and rapidly address a potential problem. As such, the yellow light thresholds can typically be exceeded by a single negative monitoring result (i.e., summer water temperatures). The red light threshold is usually triggered by multiple negative monitoring responses (a series of yellow light triggers) and indicates a more serious condition than the yellow light threshold. The intent is to provide a timely review of monitoring data to allow for corrective actions to occur, if necessary, prior to the next season.

A. Rapid Response Monitoring

The Rapid Response Monitoring projects and programs will provide the early warning signals necessary to ensure that the biological goals and objectives of the AHCP will be met. While trends which occur over longer time scales will also be monitored through these projects, they are distinguished from the response and trend monitoring projects by their potential to provide rapid feedback for adaptive management. The yellow light threshold for these projects can typically be triggered in less than one year, although the annual analysis of results will be necessary to identify the yellow light condition. The red light threshold will generally take two to three years to be triggered.

1. Property-wide Water Temperature Monitoring

Objectives and Thresholds

Maintaining cool water temperature regimes consistent with the requirements of the Covered Species is a biological goal of the AHCP. To inform appropriate biological objectives and adaptive management thresholds for achieving this goal, an analysis was conducted of 400 stream temperature profiles collected in the Plan Area from 1994 to 2000. The results pointed to watershed area as a key factor in water temperatures, and were used to help set the following biological objectives:

1. Summer water temperatures in 4^{th} order or smaller Class I and II watercourses with drainage areas less than approximately 10,000 acres will have a 7DMAVG below the upper 95% Prediction Interval (PI)

described by the following regression equation: *Water Temperature* (^oC) = *14.35141 + 0.03066461x square root of Watershed Area (acres)*

2. No significant increases (>2 ^oC) in the 7DMAVG water temperature in Class I or II watercourses following timber harvest that are not attributable to annual climatic variation.

Yellow and red light thresholds for adaptive management were adopted based on these objectives.

- The yellow light thresholds in Class I and II watercourses with drainage areas generally less than 10,000 acres are:
  a) A 7DMAVG water temperature above the upper 95% PI, as described by the regression equation: *Water Temperature* (^oC) *= 14.35141 + 0.03066461x square root of Watershed Area (acres);* or
  b) Any statistically significant increase in the 7DMAVG water temperature of a Class I or II watercourse where recent timber harvest has occurred, which cannot be attributed to annual climatic effects.

- The red light thresholds in Class I and II watercourses with drainage areas generally less than 10,000 acres are:
  a) A 7DMAVG water temperature above the upper 95% PI plus one °C, as described by the regression equation: *Water Temperature* (^oC) *=15.35141+ 0.03066461x square root of Watershed Area (acres)*;
  b) An absolute water temperature of 17.4 °C (relevant for fish); or
  c) A 7DMAVG water temperature that triggers a yellow light for three successive years.

Project Status

Monitoring of Class I (fish-bearing) and Class II (non-fish bearing) stream temperatures is operational and has been ongoing since 1994. More than 2,700 stream temperature profiles have been collected since 2000 from throughout the AHCP Plan Area. Over 140 temperature loggers are deployed annually. To date over the life of the AHCP, 2007-2022, 2,493 stream temperature profiles have been collected.

The objective of this project is accomplished by installing temperature dataloggers (Onset Computer Corp.) in Class I and II streams across the Plan Area. Dataloggers are deployed where the water is well-mixed; typically at the head of a shallow pool just below a riffle input. Dataloggers are usually deployed in May after the winter flows have subsided, and they are typically retrieved in October. This monitoring period ensures that the warmest period of the year is measured. Each datalogger is fixed in the stream and covered with cobble to assure that the sensor stays submerged and is not exposed to direct sunlight. Water temperature measurements are logged every 1.2 hours for the duration of the monitoring period. A database has been developed to store data, assess thresholds, and calculate summary statistics. Improvements were made to the accuracy of monitoring site locations (current and many historical sites). This improvement also allowed for upgrading the accuracy of the watershed areas calculated for each monitoring sites. Watershed area was calculated with a Flow Accumulation Model using the best available data from either GDRCo LiDAR digital elevation model (DEM, accuracy = ± 1 meter) or USGS 10-meter DEM.

A reanalysis of the appropriate adaptive management thresholds was proposed to the Services in the March 2011 request for Minor Modifications. The intent of this request was to address the finding that current thresholds are regularly exceeded without causal links to management activities under AHCP/CCAA prescriptions. Reanalysis could potentially establish a better Prediction Interval and minimize the apparent false positives detected using the current thresholds. After review and consideration, the Services recommended that the current thresholds be maintained at this time. Green Diamond acknowledges this decision and will maintain using the original thresholds established for this monitoring program.

Reporting Requirements

Sites that exceed a yellow or red light threshold are reported to the Services within 30 days after an analysis indicating that a threshold has been exceeded (AHCP Section 6.2.6.1.1). The temperature recorders are typically recovered from the field in October and the data are downloaded shortly after. Prior to analysis data are proofed for quality assurance. After completing the analysis, the results are reported to the Services via email correspondence.

Results

A combined total of 300 stream temperature profiles were collected in 2021 and 2022 at Class I and II streams for the property-wide water temperature monitoring program. During this two-year monitoring period twenty-two yellow light and thirteen red light thresholds were exceeded (Table 20). Compared to past monitoring efforts, the 2021 and 2022 monitoring seasons experienced a higher than average (11.4) number of exceedances with 14 and 21 exceedances, respectively (Table 20). Only stream temperature sites from the Plan Area that have <10,000 acres of watershed upstream are evaluated for threshold exceedances and included in this summary.

Table 20. Summary of property-wide water temperature monitoring threshold exceedances documented from 2007-2022.

		Threshold Exceedences			
Year	**# Sites Monitored**	**Yellow light**	**Red light**	**Total**	**%**
2007	158	9	2	11	7.0
2008	168	3	0	3	1.8
2009	157	1	1	2	1.3
2010	141	0	0	0	0.0
2011	143	0	0	0	0.0
2012	162	0	0	0	0.0
2013	157	10	0	10	6.4
2014	155	6	0	6	3.9
2015	161	16	3	19	11.8
2016	155	4	5	9	5.8
2017	160	35	16	51	31.9
2018	160	4	1	5	3.1
2019	159	11	3	14	8.8
2020	157	13	4	17	10.8
2021	142	8	6	14	9.9
2022	158	14	7	21	13.3
Mean	155.8	8.4	3.0	11.4	7.2

Discussion

Variation in summer weather conditions is the most probable explanation for the variation in exceedances documented since 2007. It appears that there is a correlation between minimum August air temperatures and the percent of water temperature threshold exceedances (Figure 7). The relationship between air temperature and stream temperature is well established (Mohseni and Stefan 1999) and based on this relationship the results from 2021-2022 were not unexpected. It appears that the driver for the percent of water temperature threshold exceedances is the deviation of the minimum air temperature from the 30-year normal at the water temperature sites (Figure 7A). Over the past 16 years, the deviation of the August average minimum air temperature has been elevated. In general, when there have been higher daily minimum air temperatures in August; air temperatures have not been cooling off as much at night. This translates to increased water temperatures because the water temperature, similarly, is not able to cool off at night allowing the water temperature to increase more the following day with the water starting at a warmer temperature to begin with. In 2021, the August average minimum air temperature was 1.4 °C above the 30-year normal for all monitoring sites and correspondingly 9.9% of the water temperature sites experienced exceedances. In 2022, August average minimum air temperature for all the temperature sites was 2.9 °C above the 30-year normal (1.5 °C warmer than 2021). As a result, seven more sites (13.3% of the total sites) experienced exceedances in 2022. Generally, when the August average minimum air temperature is close to the 30-year normal, there are fewer water temperature exceedances; and, when the August average minimum air temperature deviates above the 30-year normal, more temperature exceedances occur.

The average percentage of sites exceeding the 95% PI over the last sixteen years has generally been within the expected range. Given the 95% PI basis for the thresholds; by definition, an average of 5% of sites should fall outside of the PI, with half above and half below. The probability distribution on which these water temperature monitoring thresholds were established ensures that some thresholds will be exceeded in most years. The number of exceedances in 2021 and 2022 were above the expected amount and were likely caused by increased summer air temperatures.

Despite the red and yellow light water temperature thresholds that were exceeded during the 2021 and 2022 monitoring periods, following an extensive review of AHCP Covered Activities upstream and immediately adjacent to water temperature monitoring sites as well as historical water temperature data, it was determined that the observed water temperature exceedances at these sites were not biologically significant for the Covered Species. Salmonids thrive in dynamic environments as long as the water is fairly cool (< 22 °C maximum; Moyle 2002). During our summer monitoring period, there are three primary salmonid species that may be encountered in Class I streams located on GDRCo ownership: Coho (*Oncorhynchus kisutch*), Steelhead (*Oncorhynchus mykiss irideus*) and Coastal Cutthroat (*Oncorynchus clarkii clarkii*). These animals are cold water adapted and generally inhabit streams ranging in temperature from 10 to 16 °C, but may be found in warmer conditions if food is plentiful and habitat conditions are favorable (Moyle et al. 2016). Two amphibian species that are often encountered in Class I streams are Coastal Giant Salamanders (*Dicamptodon tenebrosus*) and Coastal Tailed Frogs (*Ascaphus truei*). These two species also inhabit Class II streams. Southern Torrent Salamanders (*Rhyacotriton variegatus*) inhabit Class II streams but are usually associated with seeps and headwater habitats. These amphibian species are cold water adapted and generally inhabit streams ranging in temperature from 7 to 16 °C but can tolerate warmer temperatures under certain conditions (Adams and Frissell 2001, Bury 2008, Brown 1975, Diller and Wallace 1996, Diller and Wallace 1999). Additionally, these threshold temperatures are not sustained for long periods of time and drop to levels that are more favorable to the species.

While some of the sites that had water temperature exceedances also had some level of timber harvest above the monitoring site, it is unlikely that timber harvest overall had a significant negative influence on water temperatures at these sites. Some sites had temperature threshold exceedances in previous years when no recent timber harvest had occurred. The exceedances triggered are likely from site specific situations such as increased average minimum air temperature during August. GDRCo believes that the results to date indicate that the Operating Conservation Program is achieving its goal of maintaining water temperatures that meet the needs of the Covered Species.

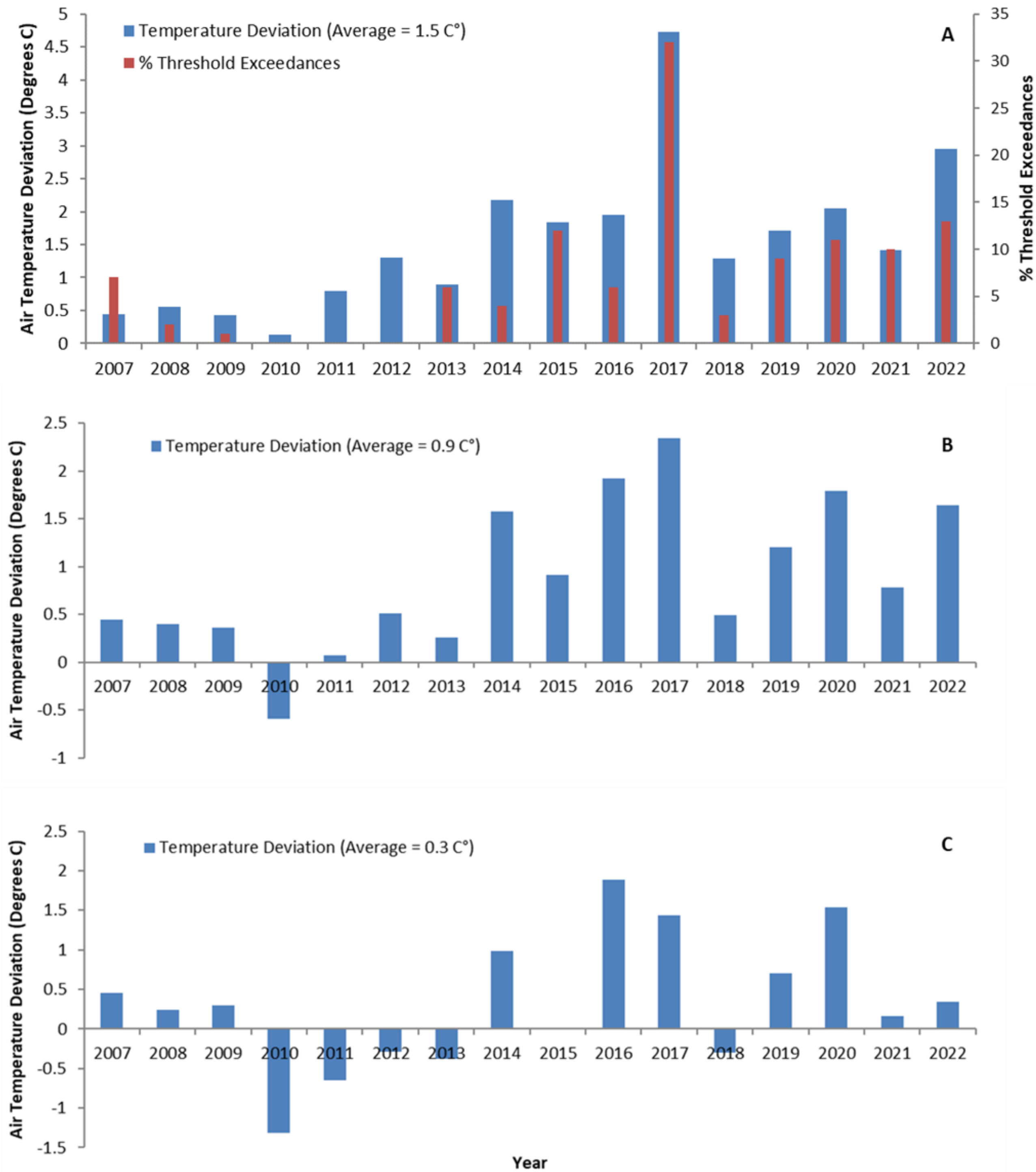

Figure 7. Deviation in minimum (A), mean (B) and maximum (C) air temperature from the 30-year normal for the month of August. Additionally, histogram (A) includes percent of monitoring sites (red bars with secondary y-axis) that experienced a threshold exceedance each year to show the association with this climatic metric (correlation = 0.88).

2. Coastal Tailed Frog Monitoring

Introduction

The Coastal Tailed Frog (*Ascaphus truei*) component of the headwaters amphibian monitoring program consists of two objectives. The primary objective is to determine if timber harvest activities have a measurable impact on larval tailed frog populations. These sites are monitored on an annual basis (Figure 8). The secondary objective is to document long-term trends in larval Coastal Tailed Frog populations over GDRCo's ownership via occupancy surveys (Figure 9). Occupancy surveys are repeated approximately every ten years. Change in occupancy of larval Coastal Tailed Frog populations in Class II watercourses throughout the plan area will be assessed using the historical baseline established in 1995 of 75% occupancy.

In 2013 pilot surveys using environmental DNA (eDNA) were conducted to test the efficacy of using eDNA to survey for the occurrence of Coastal Tailed Frogs. This led to a collaboration with a California State Polytechnic University, Humboldt graduate student involving eDNA sampling in three sub-basins in which multiple water samples were collected every 100 m over approximately 2 km stream reaches, coupled with 100% rubble-rouse/visual encounter surveys (VES) for larval Coastal Tailed Frogs. The objectives of this study were to relate the occurrence and density of eDNA in water samples with the distribution and abundance of larval Coastal Tailed Frogs. Detection rates for eDNA sampling (≥94%) were higher than those for our traditional sampling (≥91%), showing that eDNA sampling is an effective method of monitoring Coastal Tailed Frog presence (Smith 2017).

Project Status

-Primary Objective: *Annual Monitoring*

The annual monitoring program to assess timber harvest impacts on larval Coastal Tailed Frog populations was reviewed in 2014. A summary of the history of research and monitoring in addition to the results from recent data analyses and a proposed future monitoring direction were compiled into a report which was included in the 4th Biennial Report (GDRCo 2015a, Appendix D, Part 1). After completing the 2013 sampling season, the original larval Coastal Tailed Frog monitoring objectives and thresholds (see AHCP Appendix D.1.6.2.1.1 for details), as well as the revised protocol submitted to the Services in 2012 were discontinued. A formal data analysis was conducted in 2014 by Western EcoSystems Technology Incorporated (WEST Inc.) and the results justified discontinuing this project. Details on the data analysis for the project and results were provided in the 4th Biennial Report (GDRCo 2015a, Appendix D, Part 2). Based on the findings from this study, we have concluded that modifications to the original study design and established thresholds were warranted. The Services were briefed on the results during a meeting in 2014 and were also introduced to the proposed direction of future monitoring efforts for this project (GDRCo 2015a, Appendix D, Part 3). Upon acceptance of the proposed monitoring protocol by the Services, the current monitoring protocol uses a light-touch rubble rouse/VES method to confirm larval Coastal Tailed Frog presence and is conducted during early spring in conjunction with the deployment of water temperature sensors. Occupancy specific sampling was initiated in 2015 and has continued through 2022.

-Secondary Objective: *Property-wide Occupancy Surveys*
Changes to the protocol regarding long-term monitoring of property-wide larval Coastal Tailed Frog occupancy have been reviewed and modifications to this monitoring project have been approved. The 2nd Biennial Report (GDRCo 2011a) provided a summary of the project history and results from a preliminary analysis completed in 2009 by WEST Inc. Additional analyses were conducted and the results were provided in the 4th Biennial Report (GDRCo 2015a, Appendix D, Part 2). Based on the findings from this study, we have concluded that modifications to the original study design and established triggers were warranted. The Services were briefed on the results in 2014 and were also introduced to the proposed direction of future monitoring for this project (GDRCo 2015a, Appendix D, Part 3). On April 27, 2018, GDRCo submitted a minor modification request with the proposed revisions to the property-wide occupancy survey protocol. Revisions to this protocol were approved by the Services on May 20, 2019 (See Section II.D.1.). Field work for this project was initiated May 20, 2019, and concluded March 20, 2020.

The following is a summary of the revised property-wide larval Coastal Tailed Frog occupancy survey protocol: Upon arrival at each stream, a 1L water sample was obtained to test for the presence of Coastal Tailed Frog eDNA. Biologists then collected habitat data (e.g., wetted width, active channel width, water depth, stream gradient, substrate composition, substrate embeddedness, riparian tree composition), as well as searched for larval Coastal Tailed Frogs using the same light-touch/VES methodology employed during our annual monitoring efforts. Each stream was searched until larval presence was documented or until 200 m of stream habitat was searched. If larval presence was documented within the 200 m stream segment surveyed, the first eDNA sample was not tested for Coastal Tailed Frog presence but was run to test for the presence of the chytrid fungus and collection of a second eDNA sample was not necessary. If larval Coastal Tailed Frogs were not detected within the 200 m survey, a second eDNA sample was obtained at the top of the reach. Both samples were run to test for Coastal Tailed Frog presence, but only the first sample was run for the presence of chytrid. In changing from a relative abundance-based rubble-rouse survey to a presence/absence survey employing a combination of light-touch rubble rouse/VES techniques and eDNA sampling, we were able to reduce the amount of habitat searched (from 1000 m to 200 m), therefore reducing the disturbance to stream habitats.

Results

-Primary Objective: *Annual Monitoring*
Larval Coastal Tailed Frog population monitoring was initiated in 1997 at three paired sites (n = 6 sites) to assess occupancy and derive population estimates for this species on GDRCo ownership. By 2011 the number of monitoring sites had increased to ten paired sites (n = 20; Figure 8; Table 21). These sites were monitored between 1997 and 2013, having 100% larval occupancy every year at all sites (Table 21). In 2014, data were analyzed for this period (1997-2013), and it was determined that there were no biologically meaningful management impacts (negative or positive) to larval Coastal Tailed Frog populations (GDRCo 2015a, Appendix D, Part 2). It was decided that the objectives of this phase of monitoring were met and the new objective of monitoring larval Coastal Tailed Frog occupancy at these sites was initiated. One set of our paired sites in the Bear Creek drainage was located on property sold in 2013, which brought our number of paired sites to 9 (n = 18; Figure 8). In 2015 annual larval occupancy surveys were initiated at the remaining sites. We have had 100% larval Coastal Tailed Frog occupancy at all of our annual monitoring sites every year since the start of this new monitoring objective (Table 21).

-Secondary Objective: *Property-wide Occupancy Surveys*
Following formal analyses of the 1995 and 2008 data sets, results for the long-term Coastal Tailed Frog occupancy monitoring study across GDRCo's ownership were provided in the 4th Biennial Report (GDRCo 2015a, Appendix D, Part 2). In this report we are presenting a comparison of the proportion of sites occupied during each survey period (1995, 2008, 2019), as a formal analysis has not yet been performed on all three sampling periods. As a result of land acquisitions and sales between 1995 and 2019, there was some variation in the sites surveyed during each of the three sampling periods (Figure 9).

Our initial property-wide occupancy surveys in 1995 established a baseline occupancy rate of 75% (54 of 72 sites; Table 22) for larval Coastal Tailed Frogs. During the 2008 survey, 85 sites were surveyed across the property (Figure 9), resulting in a larval occupancy rate of 83.5% (71 of 85; Table 22). Of the 85 sites surveyed in 2008, 67 were initially surveyed in 1995. Occupancy rates of these original 67 sites increased from 77.6% (1995) to 83.6% (2008). During our third round of property-wide occupancy surveys in 2019, a total of 72 sites were surveyed, 55 of which were from the original set of sites surveyed in 1995 and revisited in 2008 (Table 23). Our 2019 survey used light-touch rubble rouse/VES coupled with eDNA sampling to determine Coastal Tailed Frog occupancy, as well as test for the presence of the chytrid fungus, which can have detrimental effects on amphibian populations (Skerratt et al. 2007). Because eDNA sampling was used, we were able to reduce our light-touch rubble rouse/VES sampling reaches from 1000 m to 200 m, and in turn were sampling much less of any given site. With our revised sampling protocol, we detected larval Coastal Tailed

Frogs at 77.8% of the sites via light-touch rubble rouse/VES sampling (Table 22). However, the occupancy rate for Coastal Tailed Frogs of any life history stage (e.g., larva, juvenile, adult) was 83.3% and when factoring in results from eDNA sampling, our occupancy rate increased to 87.5% (Table 22), a higher occupancy rate than our two previous survey periods. Of the 55 sites surveyed during all three periods, in 2019 we saw 87.2% occupancy for any life history stage and 81.8% larval occupancy, a 10.9% increase in any life history stage occupancy and 5.5% increase in larval occupancy when compared to the original surveys in 1995 (Table 23). When factoring in our eDNA results for these 55 sites, we saw an occupancy rate of 90.9% (Table 23). Out of 72 sites surveyed in 2019, four sites (5.6%) tested positive for the presence of the chytrid fungus (Figure 9).

<u>Discussion</u>

Previous studies on GDRCo property have indicated that many streams inhabited by Coastal Tailed Frogs had at least some evidence of habitat being negatively impacted by past unregulated timber harvest (Wallace and Diller 1998, Diller and Wallace 1999). This was particularly evident in lower gradient reaches where fines were likely to accumulate and substrates became embedded; however, most populations persisted, particularly in high gradient reaches and where the underlying geology was generally favorable (i.e., not young, uplifted marine or unconsolidated bedrock). We have learned from 27 years of monitoring larval Coastal Tailed Frog populations, that the distribution and abundance of populations has been at a minimum stable, but most likely increasing. This is likely due to improved protections allotted to aquatic habitats in more recent years through the AHCP. Other factors that may have ameliorated the negative effects of past unregulated timber harvest on Coastal Tailed Frog populations include cool summer temperatures (relative to inland areas) and coastal fog, as well as shorter larval periods (1-2 years) compared to higher elevation, inland populations (up to five years; Wallace and Diller 1998)

Based on a combination of light-touch rubble-rouse/VES and eDNA sampling, our 2019 property-wide Coastal Tailed Frog occupancy rate was 87.5%. When looking at larval detections using only the light-touch rubble-rouse/VES method, our 2019 occupancy rate was 77.8%, still exceeding the baseline occupancy of 75% established during the 1995 surveys (Tables 22 and 23); however, when excluding eDNA sampling the 2019 larval occupancy rate was lower than the 2008 larval occupancy rate (Tables 22 and 23). This decrease in larval detection was likely due to the reduction in rubble-rouse/VES reach lengths from 1000 m to 200 m during our 2019 surveys. On some streams during the 1995 and 2008 surveys, larvae were not detected until well past the 200 m reach lengths searched during our 2019 surveys. It should be noted that eDNA occupancy cannot account for life history stage, therefore we cannot say with confidence that the streams that did not have larval detections through light-touch rubble-rouse/VES, but had positive results via eDNA sampling, do indeed support breeding populations of Coastal Tailed Frogs. Nonetheless, we can say that the frogs are present within those drainages.

Out of 72 sites tested in 2019 for the presence of the chytrid fungus through eDNA sampling, four sites tested positive for the presence of the fungus, indicating that the fungus is not present on a large scale in streams inhabited by Coastal Tailed Frogs across GDRCo's ownership. Conversely, of the 90 larval Coastal Tailed Frogs captured during the property-wide and annual occupancy surveys (90 sites) none showed signs of chytridiomycosis. Decontamination measures have been and will continue to be followed by GDRCo at all sampling sites for all projects to avoid the potential spread of harmful pathogens.

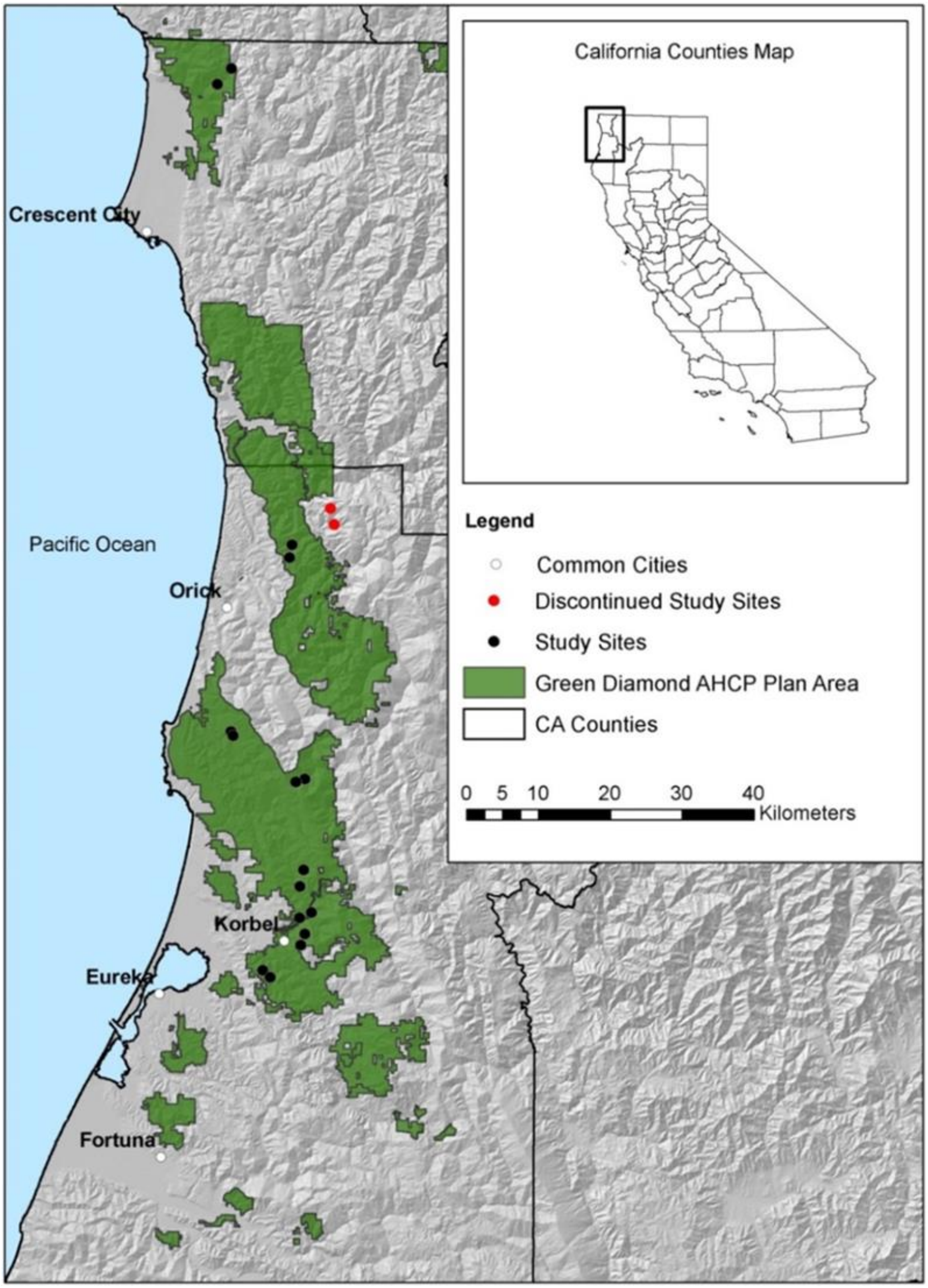

Figure 8. Locations of current annual Coastal Tailed Frog monitoring sites (n = 18), as well as, discontinued sites (n = 2), Del Norte and Humboldt Counties, California (n = 20; at this map scale, some site locations overlap).

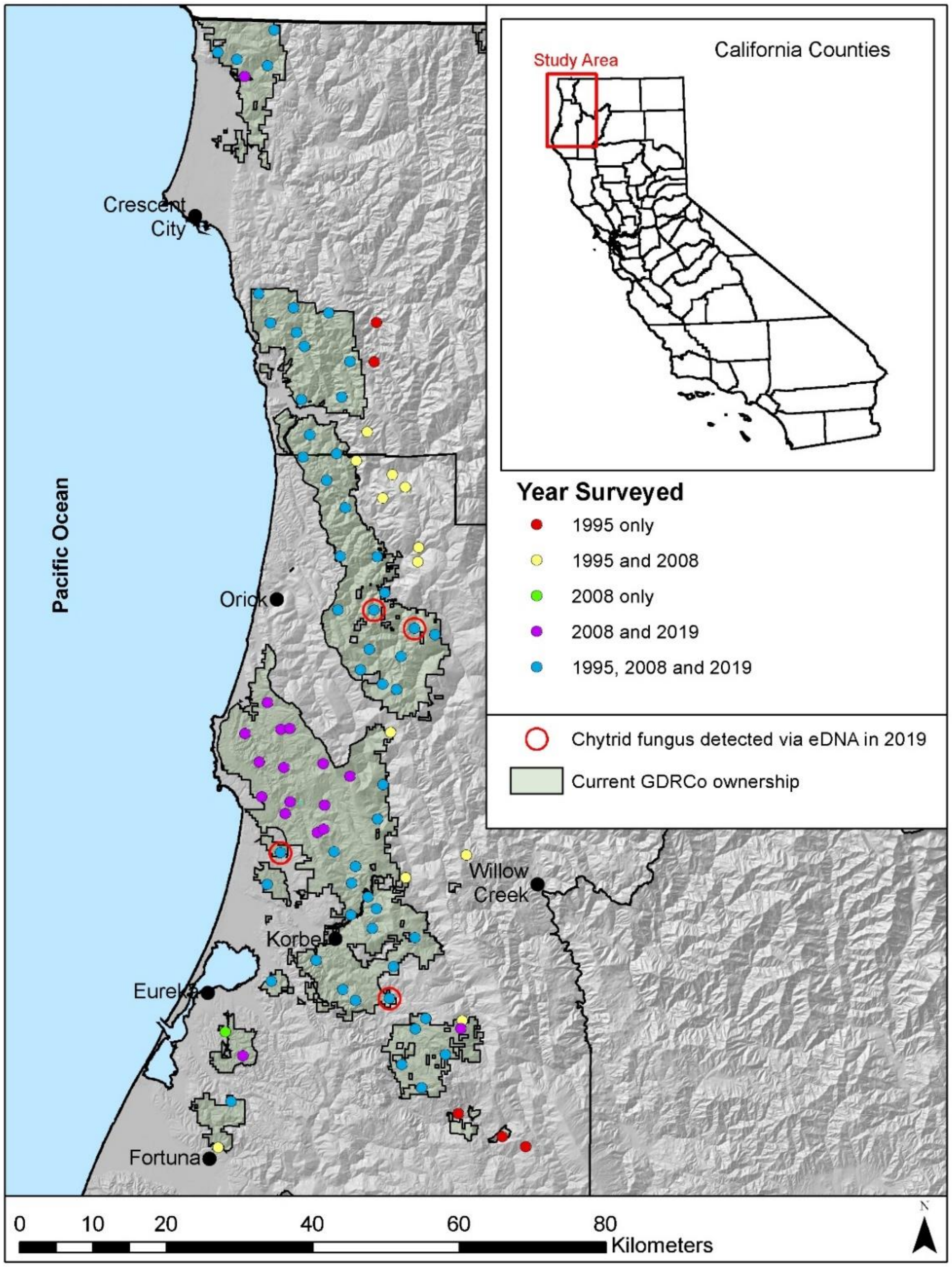

Figure 9. Locations of larval Coastal Tailed Frog property-wide occupancy survey sites (1995, 2008 and 2019) and where the chytrid fungus was detected (2019 only) via eDNA sampling, Del Norte and Humboldt Counties, California.

Table 21. Coastal Tailed Frog larval occupancy between 1997 and 2022 at GDRCo's annual monitoring sites ("+" = occupied by larval tailed frogs; "NS" = not surveyed; sites that were not surveyed prior to 2011 had not yet been established, sites not surveyed after 2014 were on property that was sold). Paired sub-basin larval population monitoring was suspended upon the completion of the 2013 field season, no sites were surveyed during the transitional 2014 season. In 2015 larval occupancy surveys were initiated at our annual monitoring sites (n=18) and have continued through 2022.

	Year																									
Site Name	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Dog 5300	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Black Dog 5400	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Mule	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Pollock	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Poverty	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Jiggs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Hatchery	NS	NS	NS	NS	NS	NS	NS	NS	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Canyon	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Panther CR2960	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Panther CR 2970	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
NF Maple BL2000	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
NF Maple BL 2600	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Surpur West	NS	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Surpur South	NS	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Bear BC200	NS	NS	NS	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bear BC270	NS	NS	NS	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rowdy R1700	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Rowdy R1000	NS	NS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NS	+	+	+	+	+	+	+	+
Tectah T190	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	+	+	+	NS	+	+	+	+	+	+	+	+
Tectah T100	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	+	+	+	NS	+	+	+	+	+	+	+	+
Occupancy	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NS	100%	100%	100%	100%	100%	100%	100%	100%

Table 22. Comparison of landscape-level Coastal Tailed Frog occupancy at all sites, each year surveyed. (LHS = life history stage; eDNA samples only collected during the 2019 survey).

Year	Streams Surveyed	% Occupied (any LHS)*	% Occupied (Larva)*	% Occupied (eDNA)^
1995	72	75.0	75.0	x
2008	85	84.7	83.5	x
2019	72	83.3	77.8	87.5

* = Detected via rubble rousing; ^ = Detected via rubble rousing or eDNA

Table 23. Comparison of Coastal Tailed Frog occupancy amongst streams originally surveyed in 1995 and revisited in 2008 and 2019 (LHS = life history stage; eDNA samples only collected during the 2019 survey).

Year	Streams Surveyed	% Occupied (any LHS)*	% Occupied (Larva)*	% Occupied (eDNA)^
1995	55	76.3	76.3	x
2008	55	83.6	81.8	x
2019	55	87.2	81.8	90.9

* = Detected via rubble rousing; ^ = Detected via rubble rousing or eDNA

3. Southern Torrent Salamander Monitoring

Introduction

There are two objectives associated with the Southern Torrent Salamander (*Rhyacotriton variegatus*) component of the headwaters amphibian monitoring program. Similar to the Coastal Tailed Frog monitoring program, the primary objective of the Southern Torrent Salamander monitoring program is to determine if timber harvest activities have a measurable impact on salamander populations at our annual monitoring sites (Figure 10). The secondary objective is to document long-term changes in Southern Torrent Salamander populations across GDRCo's ownership. Property-wide occupancy surveys have been repeated at approximately 10-year intervals (1994, 2008 and 2019; see Diller and Wallace 1996, GDRCo 2009; Figure 11). Change in occupancy of Southern Torrent Salamander sub-populations in Class II watercourses throughout the Plan Area will be assessed using the historical baseline of 80% occupancy established in 1994.

Project Status

-Primary Objective: *Annual Monitoring*

Since GDRCo began monitoring Southern Torrent Salamander populations for potential impacts of current timber harvest practices, the protocol has undergone minor revisions. Modifications to the original AHCP protocol (AHCP Appendix D.1.6.1) were proposed to the Services in the March 2011 request for Minor Modifications. The intent of this request was to adjust to the challenges and issues experienced with past monitoring efforts. Details on the history of this monitoring project and past challenges were provided in the 2nd Biennial Report (GDRCo 2011a). After review and consideration, the Services concurred with the proposed modifications and requested the revised protocol be provided for review and approval. On July 24, 2012, the Services were provided with the revised protocol for this monitoring program. No revisions were requested by the Services and the revised protocol was implemented for this monitoring program at all 30 of our annual monitoring sites. More recently we have noticed larval detections at some of our annual monitoring sites declining, therefore with the approval of the Services we initiated a return to a biennial survey schedule in 2019 where we randomly selected half of our annual monitoring sites (n=15) to be surveyed for larval Southern Torrent Salamander occupancy and the outstanding sites (n = 15) in 2020. This biennial survey schedule will be continued into the future, allowing sites a longer recovery period between surveys. On April 23, 2019, GDRCo submitted the revised protocol reflecting this biennial sampling schedule. The Services evaluated and approved the modified protocol on May 20, 2019 (See Section II.D.2.).

The current monitoring protocol uses a light-touch visual encounter survey (VES) method to confirm larval Southern Torrent Salamander presence and is conducted during late fall/early winter in conjunction with the retrieval of water temperature sensors. Occupancy specific sampling was initiated in 2015 and has been conducted through 2022 (Table 24).

-Secondary Objective: *Property-wide Occupancy Surveys*
The long-term monitoring of Southern Torrent Salamander occupancy was initiated in 1994, with the 2nd and 3rd rounds occurring in 2008 and 2019. The 2nd Biennial Report (GDRCo 2011a) provided a summary of the project history and results from a preliminary analysis completed in 2009 by Western EcoSystems Technology, Incorporated. Additional analyses were conducted and the results were provided in the 4th Biennial Report (GDRCo 2015, Appendix D, Part 2). Based on the findings from this study, it was determined that modifications to the original study design and established triggers were warranted. The Services were briefed on the results during a meeting in 2014 and were also introduced to the direction of the proposed future monitoring for this project (GDRCo 2015a, Appendix D, Part 3). On April 27, 2018, GDRCo submitted a minor modification request to the Services with the proposed revisions to the property-wide Southern Torrent Salamander occupancy survey protocol. The change proposed was a shift from an occupancy and relative abundance-based survey to just an occupancy survey. As the presence of larval salamanders indicates that the site provides sufficient habitat for reproduction and rearing, it was decided that this was an appropriate metric for monitoring potential impacts of timber harvest on populations. Revisions to the protocol were approved by the Services on May 20, 2019 (See Section II.D.1.). During the 2019 survey, each stream was searched until larval Southern Torrent Salamander presence was documented or until 500 m of habitat was searched. For each amphibian encountered, the following information was recorded: species, life history stage, sex (if possible), snout-vent length, total length and location of capture (distance upstream from start of survey). Although the goal was to detect larval Southern Torrent Salamander presence, any Southern Torrent Salamander encountered was considered occupancy due to the understanding that these salamanders are considered to be highly aquatic even in post-metamorphic stages and have relatively small home ranges (Nussbaum et al. 1983, Petranka 1998, Welsh and Karraker 2005).

Due to property sales and acquisitions, the number of sites surveyed from 1994 to 2008 had changed. As a result of these transactions, from 1994 to 2008, six sites were dropped, and 20 new sites were added (Figure 11). During the 2019 surveys, 75 sites were surveyed, 55 of which were first surveyed in 1994 and revisited in 2008 and 2019. The majority of field work for the third round of this project was performed during 2019 and concluded March 5, 2020.

Results

-Primary Objective: *Annual Monitoring*
The original eight paired sub-basins (30 sites) have been monitored routinely for population persistence for 25 years (Table 24). Overall, our monitoring results show that Southern Torrent Salamanders have persisted at all sites despite concerns of an apparent negative effect from the original sampling methodology. Over the span of the

25-year monitoring period the sites have had an average of 84.6% larval occupancy, an average of 93.5% occupancy for any life history stage (e.g., larval, juvenile or adult) and 100% larval occupancy for each year surveyed at six sites (Table 24). Over the years a handful of sites (e.g., Pollock A, Jiggs A & B) have shown inconsistencies in larval persistence at the sub-population level; however, Pollock A has had larval detections as recent as 2020 and Jiggs A & B have been consistently occupied by post-metamorphic Southern Torrent Salamanders since 2009. Larval detections at Jiggs A last occurred in 2017, while larval occupancy was confirmed at Jiggs B in 2022 (Table 24).

-Secondary Objective: *Property-wide Occupancy Surveys*

Our initial property-wide Southern Torrent Salamander occupancy surveys in 1994 established a baseline occupancy rate of 80% (56 of 70 sites, any life history stage present; Diller and Wallace, 1996). This baseline threshold was met and exceeded during the 2008 (71 of 84 sites, 84.5%) and 2019 (64 of 76 sites, 84.2%) surveys (Table 25). When looking at larval occupancy, in 1994 occupancy was 70% (49 of 70 sites), 84.5% (71 of 84 sites) in 2008 and 82.9% (63 of 76 sites) in 2019 (Table 25). As a result of the property transactions mentioned in the introduction, there have been changes in the number of sites surveyed since 1994, with 56 of the original sites being surveyed all three rounds (Table 26). When looking at these 56 original sites, we see an increase in occupancy, as well as continued stability through the 2008 and 2019 surveys (Table 26). Additionally, when looking at the subset of sites surveyed in both 2008 and 2019, we see continued occupancy stability as well (Table 27).

Discussion

With the variety of site characteristics at our annual monitoring sites and varying survey methods, it is difficult to assess the exact causes of the results observed; however, it appears that timber harvest under the AHCP has not had a significant negative impact on the percentage of sites occupied by larval Southern Torrent Salamanders, with an average occupancy rate of 84.6% at GDRCo's annual monitoring sites (Table 24). Conversely, when looking at occupation of these monitoring sites by any life history stage of Southern Torrent Salamanders, we see a 93.5% occupancy rate. It is notable that out of 589 total larval occupancy surveys between 1998 and 2022, only 87 surveys (14.8%) resulted in no larval Southern Torrent Salamander detections. On surveys that had no larval Southern Torrent Salamander detections, 37.9% of the time (33 out of 87 surveys) at least one larval Coastal Giant Salamander or Coastal Tailed Frog was detected, reinforcing the fact that these sites are perennial and can support larval amphibians that require more than one year to achieve metamorphosis. Additionally, 60.9% of the time (53 out of 87 surveys) larval Southern Torrent Salamander were not detected, at least one post-metamorphic Southern Torrent Salamander was detected, indicating that these salamanders are continuing to use these sites as habitat. Only 2.7% (16 out of 559) of our annual surveys yielded zero aquatic obligate amphibian detections (e.g., Southern Torrent Salamanders (any LHS), larval Coastal Giant Salamanders or larval Coastal Tailed Frogs). Out of our 30 monitoring sites, six have had 100% larval Southern Torrent Salamander detections every year they were surveyed, and 18 sites have had 100% occupancy, either larval, post-metamorphic or both, every year they were surveyed. A detailed analysis is needed to determine the likely drivers that are influencing the results observed. Unintended consequences from the more intensive sampling (decreased habitat quality and declines in captures) from 1998 to 2003, resulted in the switch to “light-touch” presence/absence surveys. From 2004 to 2009 some sites were either not surveyed or surveyed every other year as an attempt to give the sites time to recover from the effects of the survey. Sites appeared to have recovered and annual surveys were resumed in 2010. We have observed another decline in our larval Southern Torrent Salamander detections in more recent years at some sites, and have reinstated biennial occupancy surveys. We will continue this sampling schedule into the future for this project.

With our property-wide occupancy surveys, we saw an increase in Southern Torrent Salamander occupancy rates from 80% in 1994 to 84.5% in 2008, and essentially maintained that same rate (84.3%) in 2019 (Table 25). When looking only at larval occupancy, we also saw an increase in occupancy from 70% in 1994 to 84.5% in 2008 and only a slight decline to 82.9% occupancy in 2019 (Table 25), which is a difference of one less site having a larval Southern Torrent Salamander detection (although a post-metamorphic Southern Torrent Salamander detection did occur at this site). The increase in occupancy rates, especially larval occupancy, from the 1994 surveys is promising in regard to potential impacts of timber management on the persistence of the species. Diller and Wallace (1996) found that Southern Torrent Salamander presence was closely tied to the geological formation of the stream drainage. They observed that during the1994 surveys, Southern Torrent Salamander presence was closely tied to consolidated geologic regions and the small portion of stream habitats that Southern Torrent Salamanders were not found in, generally consisted of unconsolidated materials, which appears to be unfavorable to these salamanders. This was also observed during the 2008 and 2019 surveys, as Southern Torrent Salamanders were not detected in many of the same sites surveyed in 1994 that consisted of unconsolidated materials. Overall, it would appear that the protections afforded by the AHCP are contributing to the continued persistence of this species across GDRCo’s ownership.

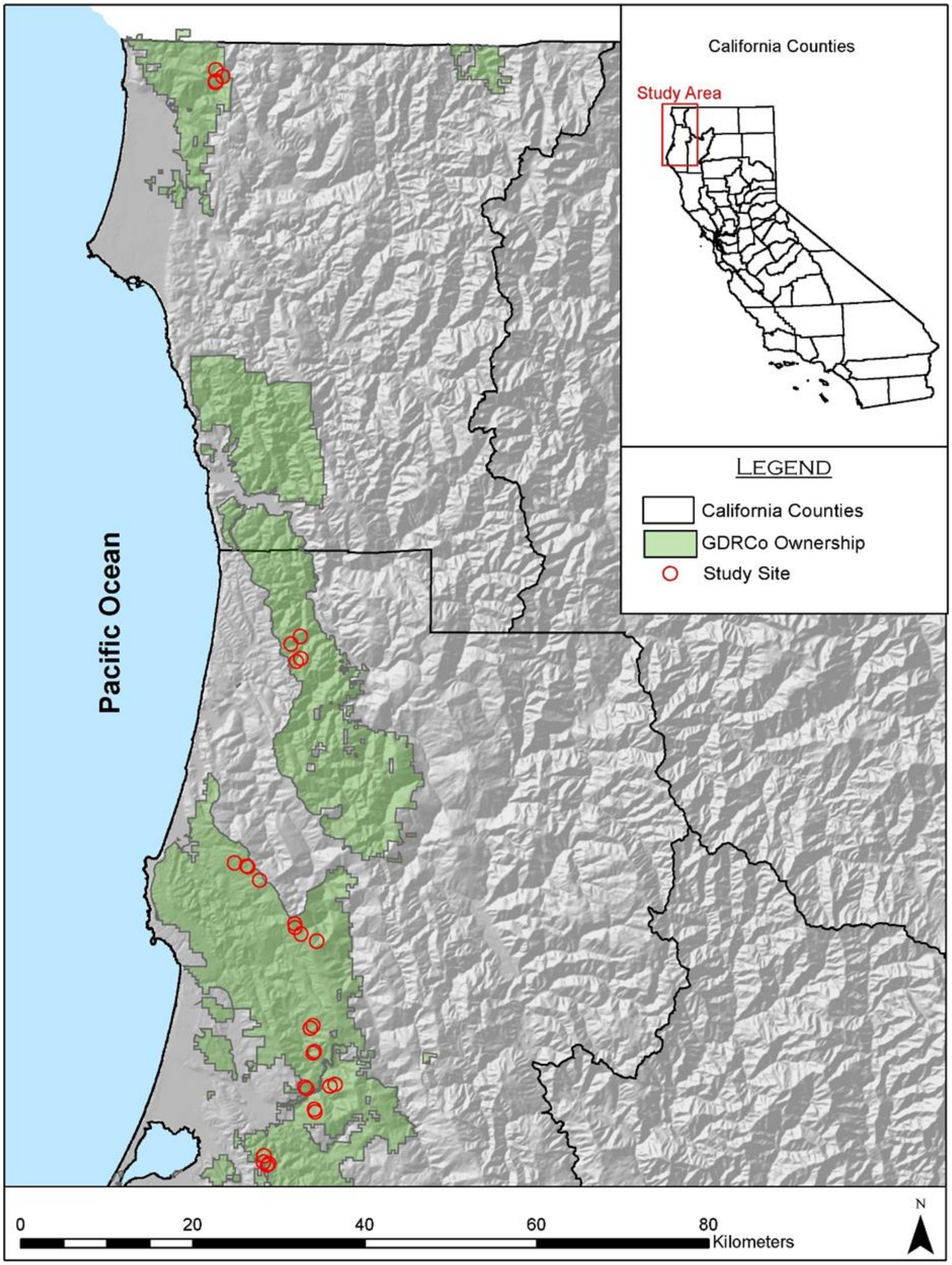

Figure 10. Southern Torrent Salamander annual occupancy survey sites, Del Norte and Humboldt Counties, California (n = 30; some sites are overlapping at this scale).

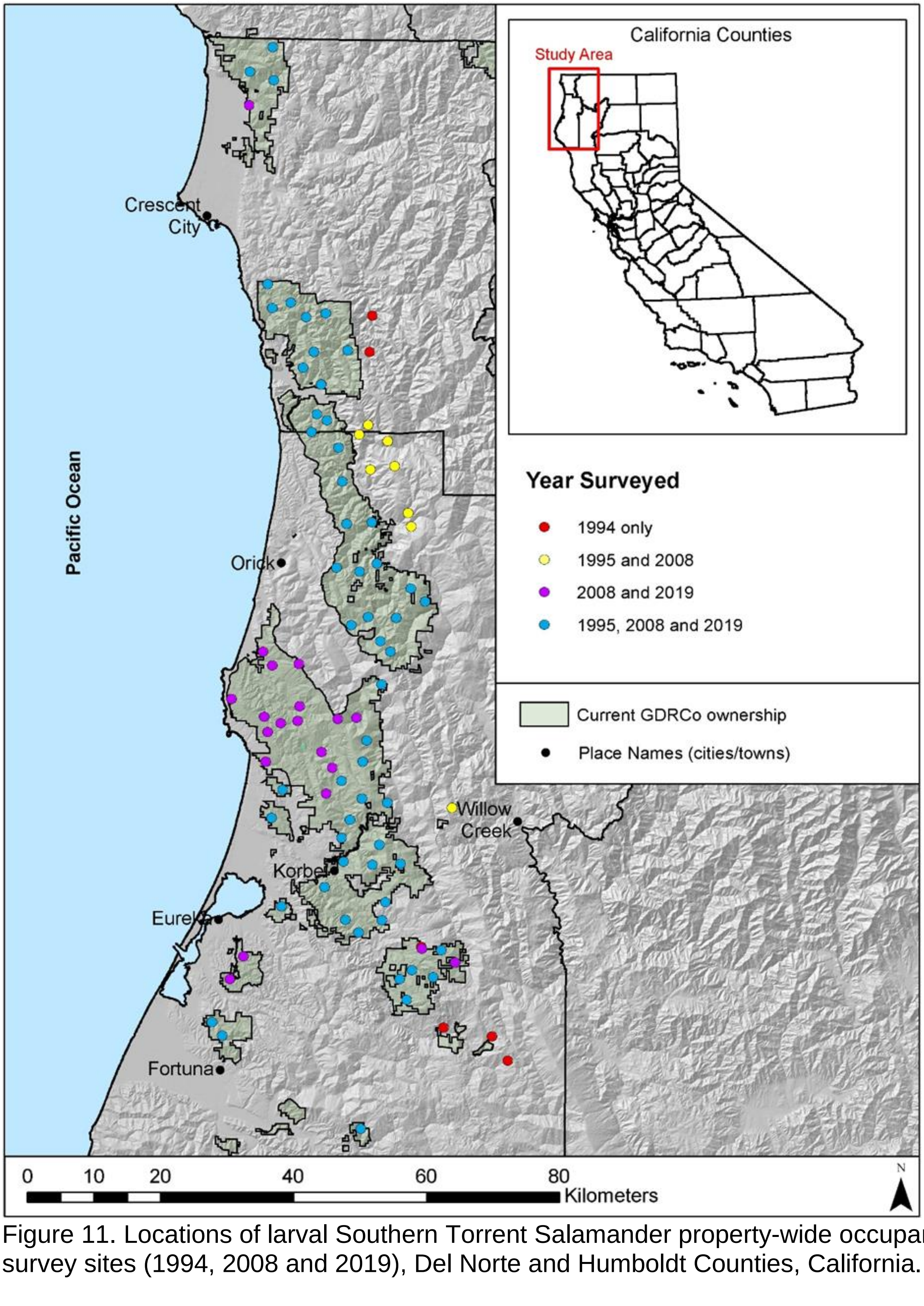

Figure 11. Locations of larval Southern Torrent Salamander property-wide occupancy survey sites (1994, 2008 and 2019), Del Norte and Humboldt Counties, California.

Table 24. Southern Torrent Salamander annual larval occupancy survey sites; number of sites surveyed and percent occupied by year (1998-2022), including whether site had larval salamanders detected (Y/N) or was not surveyed (NS).

Site Name	Year 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Number of Years Sampled	% Years with Larval RHVA Detection	% Years with any RHVA LHS Detection
BlackDog_5300_A	Y	N*+	Y	Y	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	21	95%	100%
BlackDog_5300_B	Y	Y	N*	N*+	N*	Y	NS	NS	NS	NS	N+	Y	Y	Y	Y	Y	Y	Y	N*	Y	Y	NS	Y	NS	Y	19	74%	95%
BlackDog_5400_A	Y	Y	Y	Y	Y	N+	NS	N*+	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	21	90%	95%
BlackDog_5400_B	Y	Y	Y	Y	Y	N*	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	21	95%	100%
Mule_A	Y	Y	Y	Y	Y	N*	N	NS	N+	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	20	85%	90%
Mule_B	Y	Y	Y	N*	N*	N	N	NS	N	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	75%	85%
Pollock_A	Y	N*+	N*+	N*+	N	N	NS	N	NS	N+	N+	Y	N+	N+	N+	N	N*+	N+	N	N	Y	NS	Y	NS	N+	21	19%	38%
Pollock_B	Y	Y	Y	N*	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	21	95%	100%
Poverty_A	Y	Y	Y	Y	Y	N*	Y	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	20	95%	100%
Poverty_B	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	20	100%	100%
Jiggs_A	Y	N*+	N*+	Y	N*	N	NS	NS	NS	NS	NS	Y	Y	Y	Y	Y	Y	Y	N*	Y	N*	NS	N*	NS	N*	18	56%	94%
Jiggs_B	N*+	N*	N*	N*	Y	N*	NS	NS	NS	NS	NS	N*	N*	N*	N*	N*	Y	N*	N*	Y	N*	NS	N*	NS	Y	18	22%	100%
Canyon_A	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	21	100%	100%
Canyon_B	Y	Y	Y	Y	N*	Y	NS	NS	NS	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	19	95%	100%
Panther_CR2970A	Y	Y	Y	Y	N*	Y	Y	NS	NS	NS	NS	Y	Y	Y	Y	Y	N*	N*+	N*+	Y	Y	Y	NS	Y	NS	19	79%	100%
Panther_CR2970B	Y	Y	Y	Y	N	Y	N	NS	N+	NS	Y	NS	N*+	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	80%	85%
Panther_ CR2960A	Y	Y	Y	Y	N+	N	N	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	20	85%	85%
Panther_ CR2960B	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	100%	100%
NF_Maple_A	NS	Y	Y	Y	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	100%	100%
NF_Maple_B	NS	N*+	N*+	Y	Y	Y	NS	N*	NS	N+	NS	N*+	Y	Y	Y	N+	Y	Y	N+	Y	Y	Y	NS	Y	NS	19	63%	84%
NF_Maple_C	NS	Y	Y	N+	Y	N+	NS	N	NS	N+	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	19	79%	79%
NF_Maple_D	NS	Y	Y	Y	Y	N	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	19	95%	95%
Surpur_B700	NS	NS	Y	Y	N*	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	19	95%	100%
Surpur_1042	NS	NS	N*	Y	N*	N*	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	18	83%	100%
Surpur_A400_A	NS	NS	Y	Y	Y	Y	NS	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	18	100%	100%
Surpur_A400_B	NS	NS	Y	Y	N*	N+	NS	Y	NS	Y	N*	Y	Y	Y	Y	N*+	Y	Y	Y	Y	Y	NS	Y	NS	Y	19	79%	95%
Rowdy_R1700_A	NS	Y	Y	Y	Y	Y	Y	NS	N*	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	95%	100%
Rowdy_R1700_B	NS	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	95%	100%
Rowdy_R1000_A	NS	Y	Y	Y	Y	Y	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	100%	100%
Rowdy_R1000_B	NS	Y	Y	Y	Y	N*	Y	NS	Y	NS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NS	Y	NS	20	95%	100%
# of sites sampled	18	26	30	30	30	30	12	14	11	14	21	23	30	30	30	30	30	30	30	30	30	15	15	15	15			
# of sites occupied by RHVA larvae	17	21	24	24	19	16	8	10	7	11	19	21	27	28	28	26	28	27	24	29	28	15	13	15	13			
% sites occupied by RHVA larvae	94%	81%	80%	80%	63%	53%	67%	71%	64%	79%	90%	91%	90%	93%	93%	87%	93%	90%	80%	97%	93%	100%	87%	100%	87%	Avg. % occupied by larval RHVA: 84.6%		
% sites occupied by RHVA (any LHS)	100%	100%	100%	97%	90%	73%	67%	86%	73%	79%	90%	100%	97%	97%	97%	93%	100%	97%	93%	97%	100%	100%	100%	100%	93%	Avg. % occupied by RHVA (any LHS): 93.5%		

LHS = Life History Stage; * indicates juvenile or adult RHVA detected; + indicates larval *Dicamptodon tenebrosus* or *Ascaphus truei* detected at site.

Table 25. Comparison of property-wide Southern Torrent Salamander occupancy (LHS = life history stage).

Year	No. Streams Surveyed	% Occupied (any LHS)	% Occupied (Larvae)
1994	70	80.0	70.0
2008	84	84.5	84.5
2019	76	84.2	82.9

Table 26. Comparison of property-wide Southern Torrent Salamander occupancy amongst streams originally surveyed in 1994 and revisited in 2008 and 2019.

Year	No. Streams Surveyed	% Occupied (any LHS)	% Occupied (Larvae)
1994	56	78.6	67.9
2008	56	89.3	89.2
2019	56	89.3	87.5

Table 27. Comparison of property-wide Southern Torrent Salamander occupancy amongst streams surveyed in 2008 and 2019.

Year	No. Streams Surveyed	% Occupied (any LHS)	% Occupied (Larvae)
2008	76	82.9	82.9
2019	76	84.2	82.9

4. Road Treatment Implementation and Effectiveness Monitoring

Objective

The objectives of this monitoring program are to ensure that site specific road treatment prescriptions were implemented as designed, monitor the effectiveness of road treatment prescriptions, and attempt to improve road management measures when deficiencies are identified.

Project Status

In accordance with the minor modification approved on June 15, 2011 the AHCP effectiveness monitoring programs for road-related surface erosion monitoring (AHCP Section 6.3.5.2.4) and road-related mass wasting monitoring (AHCP Section 6.3.5.4.1) were substituted with the monitoring program required under the MATO and RMWDR. Under the programmatic permits, each completed activity must be inspected twice to evaluate the implementation and effectiveness of the completed treatment, once prior the winter period and once following a full winter. If the site has stabilized and there is no reasonable potential for significant sediment delivery, then future monitoring will coincide with the Routine Maintenance Inspection Program (AHCP Section 6.2.3.9).

Results

A combined total of 721 road sites were monitored in 2021 and 2022 as part of road treatment implementation and effectiveness monitoring for road sites enrolled in the MATO. The results of the individual road site inspections for 2021 and 2022 are provided in Appendix B. All road sites were monitored by the AHCP road staff, RPF staff and contract supervisors. Two sites (0.28%) required or will require follow-up monitoring, treatment or maintenance after post-winter assessments (Table 28). In addition to the required pre- and post-winter inspections, GDRCo personnel perform incidental inspections during the winter period.

The process of road treatment monitoring involves staff entering results of inspections into the road database and reports are generated showing the site, THP number associated with the site, date of pre- and post- inspection, whether the site meets AHCP standards and any comments regarding the condition of the site. The number of pre-winter and post-winter inspections should be equal for any given year. The exception would be sites that required follow-up treatments or maintenance and they will have additional inspections. Table 28 shows there are issues for years 2012-2022 with results not being entered, results being entered erroneously (data entered for a site which has not been treated or not required to be monitored), or a combination thereof. In order to correct this discrepancy, RPF staff and AHCP road staff were given additional field and database training and updated field inspection forms in May 2015. In addition, changes to the road database were made to link site completion dates to inspection data to ensure when a site is complete, staff can be notified to perform a pre-winter inspection. These changes did not have the intended effect of greater accuracy. In January 2016, the AHCP Roads group was moved into the Operations Department. The added exposure to contract administration and considering the continued issues with collecting effectiveness monitoring data, the decision was made to focus only AHCP Road technician staff on data collection and data entry. Further refinements occurred in April 2017 to ensure road contractor invoices are received with specific information on completed road work to assist in scheduling site visits to collect data. Internal discussions related to this issue speculate that site visits are likely taking place according to protocols and any issues identified are being addressed but are not always being documented (the data entry does not always occur which results in incomplete annual summaries as reflected in the present results).

Table 28. Summary of monitoring efforts completed for the road treatment implementation and effectiveness monitoring from 2010 through 2022.

Assessment Type	Year	Assessments Completed	Maintenance Issues Recorded
Pre-Winter	2010	25	0
Post-Winter	2011	25	5
Pre-Winter	2011	244	1
Post-Winter	2012	244	2
Pre-Winter	2012	348	0
Post-Winter	2013	309	2
Pre-Winter	2013	234	0
Post-Winter	2014	259	0
Pre-Winter	2014	334	0
Post-Winter	2015	146	0
Pre-Winter	2015	186	0
Post-Winter	2016	188	11
Pre-Winter	2016	220	1
Post-Winter	2017	214	8
Pre-Winter	2017	262	3
Post-Winter	2018	262	1
Pre-Winter	2018	137*	1
Post-Winter	2019	137	0
Pre-Winter	2019	148	0
Post-Winter	2020	148	1
Pre-Winter	2020	208	0
Post-Winter	2021	192	1
Pre-Winter	2021	282	0
Post-Winter	2022	288	1
Pre-Winter	2022	244	0

*Previous Biennial Report included an erroneous figure due to a summing function issue with the data and has been corrected here.

B. Response Monitoring

The Response Monitoring projects, like the Rapid Response projects described above, monitor the effectiveness of the conservation measures in achieving specific biological goals and objectives of the AHCP. These monitoring projects are distinguished from the Rapid Response projects by the greater lag time required for feedback to the adaptive management process. The Response Monitoring projects are focused on the effects of cumulative sediment inputs on stream channels. Natural variability in stream channel dimensions, combined with the potential time lag between sediment inputs and changes in the response variables of these projects, make it difficult to determine appropriate thresholds for adaptive management at this time. When yellow and/or red light thresholds are determined, they are expected to require more than three years of results to be triggered in most cases.

1. Class I Channel Monitoring

Objectives

The objective of the Class I Channel Monitoring project is to track trends in sediment inputs in fish-bearing streams as evidenced by changes in surface particle size distributions and metrics associated with the longitudinal channel profile including overall aggradation and degradation. This monitoring approach is based on the fundamental premise that selected depositional reaches within a watercourse act as a response surface for sediment that has been transported downstream from the hillside via the upper high gradient transport stream reaches. The long-term channel monitoring project is not designed to identify the potential sources or causes of changes in the sediment budget, only to document if they are occurring. These changes are currently monitored using thalweg longitudinal profiles and pebble counts. This channel monitoring technique is generally best suited for establishing long term trends due to the potential lag times between sediment inputs and the measured response in the monitoring reach.

Class I channel monitoring is a complex study, and most likely a completely new analysis will need to be designed in order to develop thresholds. As described in AHCP Section 6.3.5.3.1, it is estimated that it will take approximately ten to fifteen years of initial trend monitoring before the appropriate thresholds can be developed and applied.

Project Status

This monitoring program is operational, ongoing, and data analysis is in progress. This monitoring effort began as a pilot study in 1993-1994, was implemented at the first site in 1995, and by 2008 the number of study sites increased to 12 streams. One additional site (North Fork Mad River) has been studied using the channel monitoring protocol and was included in past biennial reports but this site was not intended to be part of the AHCP Response monitoring and will no longer be associated with this project.

The protocol implemented for this monitoring project has undergone modifications to the collection methods, parameters collected, and sampling schedule over the years. Minor modifications to the original Class I Channel Monitoring protocol (see AHCP Appendix D.2.2.2) were proposed to the Services in the March 2011 request for Minor Modifications. A summary and justification for the requested modifications were provided in the 2nd Biennial Report (GDRCo 2011a) and the 2011 modifications request, respectively. The intent of this request was to update the protocol to reflect the current monitoring efforts being implemented for this project. After review and consideration, the Services concurred with the proposed modifications and requested the revised protocol be provided for review and approval. In August 2011, the Services were provided with the revised protocol for this monitoring program. No revisions were requested by the Services and the revised protocol was implemented for this monitoring program through 2014.

In late 2014, we initiated the process of analyzing data collected through the 2014 sampling season and in September 2016 a morphometric based evaluation of the data was presented at the 2016 Coast Redwood Science Symposium. Quantile regression was used to evaluate trends in size distributions of bed surface substrate measured at riffle crossovers. Trends in the longitudinal profiles of each site were also evaluated. We first normalized the longitudinal survey data by creating an average profile to spatially align each year's survey data. This process controlled for annual changes in stream sinuosity which can affect the overall length and gradient of the surveyed channel. Efforts to combine long-profile data collected pre-2002 (i.e., collected with original methods) with post-2001 data were attempted but these different data proved to be incompatible and the identified issues could not be resolved. Some of the challenges with combining these data were described in the 3rd Biennial Report (GDRCo 2013). Based on this assessment, we concluded that the pre-2002 long-profile and cross-section data would not satisfy the study objectives and these data have been excluded from the analysis at this time.

During analysis of the Class I Channel Monitoring data, as anticipated in the 4th Biennial Report (GDRCo 2015a), modifications to the revised protocol were initiated prior to the 2015 season and implemented through 2022. Collection of cross-section and roughness coefficient (Manning's) data were discontinued. Both of these data were found to be inadequate to evaluate the parameters and meet the monitoring objectives of this study. The modifications also included adding a way to delineate upstream and downstream extents of pool habitats from other depressions in the longitudinal profile. This allows for a more robust comparison of pool habitat metrics (e.g., count; maximum and average depth; and longitudinal area). Also, additional thalweg points are now obtained in conjunction with the standard ten-foot measurement intervals. This allows for more accurate longitudinal representation of the upstream and downstream extents of pool habitat features and channel sinuosity. These additional thalweg points are coded in the data so that current data can still be compared to previous years when thalweg points were strictly collected at ten-foot increments. Green Diamond continues to monitor both substrate particle size and longitudinal profiles for the 12 long term monitoring reaches with plans to investigate and develop thresholds that will be used to evaluate the effectiveness of the Plan.

Results

To date, twelve Class I Channel Monitoring sites have been established and routinely monitored for up to twenty-eight years (**Error! Reference source not found.**). On average, sites have been sampled 23.4 times and the monitoring duration has spanned 25.3 years. Cañon Creek is the site with longest record (twenty-eight years) of continuous monitoring.

Analysis of the pebble count data through 2014 indicate a statistically significant positive trend in the coarsening of substrate particles across the entire size class distribution for 11 of the 12 stream reaches throughout the monitoring period (Table 30). Beach Creek was the one site that had a statistically significant decrease in a larger size class (e.g. Tau 0.84) but experienced coarsening in the smaller size classes (e.g. Tau 0.16 and Tau 0.50). In quantile regression, Taus represent individual specified quantiles. Tau 0.16 represents a diameter of particles where 16% of the sediment in the sample is smaller (this is also often represented as a D16). The quantile regression slopes shown in Table 30 are the annual rates of change in particle sizes at the specified Taus. For example, in Tectah Creek, the particle size at the 16th percentile is increasing over time by 1mm per year.

Analysis of the longitudinal profile data through 2014 indicate that 5 sites had a statistically significant decrease in bed elevation, 2 sites had a statistically significant increase in bed elevation, and 6 sites had no statistically significant change in bed elevation over the study period (Table 31).

Discussion

Analysis of the pebble count data indicates that all of the reaches are exhibiting a reduction in fine sediment inputs. In fact, there was a trend in coarsening across the entire range of particle sizes for all sites except Beach Creek. Beach Creek did exhibit a reduction in substrate size however it occurred only in the larger particle size classes which we expect would not have a negative effect on fish spawning success. Examination of the longitudinal profile data indicate that at 85% of the study reaches the streambed is either stable or downcutting.

Over the course of the study period there have been improvements in forest management practices including the application of measures designed to minimize fine and course sediment inputs such as enhanced riparian protections, geologic prescriptions and extensive road upgrading and decommissioning activities as part of GDRCo's AHCP. The results of this study indicated that the implementation of these measures has been effective in reducing the amount of sediment delivered to watercourses as evidenced by the general overall trend in coarsening of the substrate and lowering or no change in the bed elevation.

GDRCo intends to analyze the pebble count and longitudinal profile data to include the most recent data in the same manner as was completed in 2014. These results will be shared with the Services when available and are expected to assist with the establishment of threshold values for this monitoring project.

Table 29. Summary of Class I Channel Monitoring survey efforts conducted by Green Diamond from 1995-2022 (Y = site was surveyed, N = site was not surveyed).

			Year																											
Site Name	**# Years Monitored**	**Monitoring Duration**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002 [1]**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015 [2]**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Cañon Creek	28	28	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hunter Creek #1	26	27		Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Salmon Creek	24	27		Y	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Canyon Creek	24	27		Y	Y	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SF Winchuck River	23	27		Y	Y	N	Y	N	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hunter Creek #2	25	26			Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tectah Creek	23	26			Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Beach Creek	22	25				Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Maple Creek	23	25				Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ah Pah Creek	21	22							Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SF Ah Pah Creek	21	22							Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Little River	21	21								Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of sites		-	1	5	7	7	7	5	10	10	12	5	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12

Blank cells represent years prior to site being developed for survey protocol.

[1] Field protocol modified to utilize total station and discontinue bank full channel dimensions.

[2] Field protocol modified to discontinue cross sectional and roughness coefficient surveys.

Table 30. Summary of pebble count quantile regression analysis. Data used was collected by Green Diamond from 1995-2014.

	Quantile Regression Slope[1]			Tau 0.16		Tau 0.50		Tau 0.84	
Site Name	**Tau 0.16**	**Tau 0.50**	**Tau 0.84**	**Lower 95% CI**	**Upper 95% CI**	**Lower 95% CI**	**Upper 95% CI**	**Lower 95% CI**	**Upper 95% CI**
Cañon Creek	1.571	1.909	2.118	1.50	1.67	1.80	2.00	1.89	2.26
Hunter Creek #1	1.111	1.167	0.800	1.00	1.18	1.00	1.29	0.57	1.07
Salmon Creek	1.286	1.500	1.600	1.20	1.40	1.36	1.63	1.40	1.80
Canyon Creek	0.900	1.438	2.000	0.81	1.00	1.30	1.56	1.75	2.20
SF Winchuck River	1.143	1.200	0.727	1.07	1.22	1.11	1.33	0.54	0.92
Hunter Creek #2	1.600	1.900	2.125	1.50	1.71	1.76	2.00	1.91	2.38
Tectah Creek	1.000	1.250	1.091	0.91	1.14	1.13	1.42	0.90	1.33
Beach Creek	0.375	0.154	-0.333	0.25	0.53	0.00	0.33	-0.50	-0.08
Maple Creek	0.933	1.400	1.538	0.90	1.00	1.33	1.50	1.38	1.67
Ah Pah Creek	0.818	1.200	1.000	0.67	1.00	1.10	1.36	0.80	1.31
SF Ah Pah Creek	1.636	2.125	3.273	1.50	1.80	2.00	2.33	3.00	3.63
Little River	1.333	1.667	2.000	1.13	1.60	1.44	2.00	1.71	2.67

Superscript definition: 1 = In quantile regression Tau's represent individual specified quantiles. A Tau 0.16 represents a diameter of particles where 16% of the sediment in the sample is smaller (this is also often represented as a D16). The quantile regression slopes shown here are the annual rates of change in particle sizes at the specified Taus. For example in Tectah Creek, the particle size at the 16th percentile is increasing over time by 1mm per year.

Table 31. Summary of longitudinal profile data aggradation/scour analysis. Data used was collected by Green Diamond from 2002-2013.

Site Name	Slope (m/yr)	Significant?	p-value	Overall channel elevation change from 2002 to 2013 (m)
Cañon Creek	-0.0171	Yes	0.0003	-0.232
Hunter Creek #1	-0.0043	No	0.6250	-0.146
Salmon Creek	0.0057	No	0.1016	0.016
Canyon Creek	-0.0379	Yes	0.0006	-0.413
SF Winchuck River	0.0017	No	0.8137	0.126
Hunter Creek #2	-0.009	No	0.2170	-0.157
Tectah Creek	0.0002	No	0.9697	-0.119
Beach Creek	0.0039	Yes	0.0479	0.040
Maple Creek	-0.013	Yes	0.0014	-0.121
Ah Pah Creek	-0.0119	Yes	0.0060	-0.161
SF Ah Pah Creek	-0.0096	Yes	0.0000	-0.104
Little River	0.0038	Yes	0.0456	0.079

2. Class III Sediment Monitoring

Objective

The objective of the Class III sediment monitoring was to quantify the amount of sediment delivered from Class III channels following timber harvest. This monitoring project was designed to test the null hypothesis that sediment delivery does not significantly change in Class III channels following timber harvest operations along Class III channels. To satisfy this objective, multiple methodologies were originally employed (i.e., channel morphology, sediment tray, turbidity monitoring, and sediment basins) to assess and quantify sediment delivery and test the hypothesis using a BACI study design.

Project Status

The protocol implemented for this monitoring project has undergone modifications to the collection methods and parameters collected over the years. Three of the methodologies originally proposed in the AHCP (i.e., channel morphology, sediment tray, and turbidity monitoring) were discontinued in 2011 and the remaining methodology that utilized sediment basins was suspended in 2014. A brief summary of these changes and current status is provided below.

Minor modifications to the original Class III sediment monitoring protocol (see AHCP Appendix D.2.3) were proposed to the Services in the March 2011 request for Minor Modifications. A summary and justification for the requested modifications were provided in the 2nd Biennial Report (GDRCo 2011a) and the 2011 modifications request, respectively. The intent of this request was to update the protocol to reflect the current monitoring efforts being implemented for this project and improve the study design for this monitoring program. After review and consideration, the Services concurred with the proposed modifications and requested the revised sampling design be developed with the Services prior to future sampling. On July 24, 2012, the Services were provided with the revised protocol for the monitoring project and updated on the status. No revisions were requested by the Services and the revised protocol was implemented through the 2014 sampling season. In May 2017, GDRCo provided the Services with a proposal to suspend the Class III sediment monitoring project based on the review of the data and the associated challenges with implementing the monitoring project. On February 13, 2018, GDRCo met with the Services to review and discuss the proposal.

Issues were experienced in 2013 and 2014 with the newest paired sites and no new additional sites have been established since then. The challenges we experienced included difficulties identifying suitable paired sites, coordinating the timing of harvest, ensuring that planned treatments were implemented during harvest, and preventing damage to sediment basins during harvest operations. These challenges have highlighted the need to suspend this monitoring project until a new study methodology can be identified. We had discussions with the Services about the future objective, threshold/trigger, and protocol associated with this monitoring project. All monitoring associated with this project has been suspended at this time.

C. Long-Term Trend Monitoring

The Long-term Trend Monitoring projects are those monitoring projects for which no thresholds for adaptive management are set. For some projects, this reflects the multitude of factors which affect the response variables, in others, the long time-scales required to distinguish the ‘noise’ from the underlying relationships. Research projects designed to reveal relationships between habitat conditions and long-term persistence of the Covered Species are also included in this section. Each of these projects has the potential to provide feedback for adaptive management, but in some circumstances, decades may be required before that can occur.

1. Long-Term Habitat Assessment

Objectives

In 2018, GDRCo completed its third round of property wide Long-Term Habitat Assessments. This project has been conducted approximately every ten years, beginning in 1994 and in 2007 it became part of the Effectiveness Monitoring Program under the approved AHCP. The objective of the Long-Term Habitat Assessment is to document trends in fish habitat quality and quantity over time on anadromous stream reaches located throughout GDRCo’s California timberlands. As we get further into the life of the AHCP, these trends will be valuable for comparison with the results of the other, more specific monitoring projects to ensure that the individual biological objectives described elsewhere (i.e., channel morphologies, water temperature, etc.) are accurately capturing the larger picture of overall aquatic stream health and function.

Project Status

This project was initiated by GDRCo in 1994 and has been conducted approximately every ten years (Table 32). It takes crews approximately 3 years to complete each round of surveys. Three full assessments have been completed. A total of 58 streams were originally surveyed within the GDRCo ownership by various organizations, both public and private. Two creeks located within the Coastal Klamath Hydrographic Planning Area (HPA) that were surveyed in the first and second assessments, Bear Creek and WF Blue Creek, were not sampled during the third assessment. Both of these watersheds were sold as part of land transactions with the Yurok Tribe and are no longer owned by GDRCo. Three creeks within the Eel River HPA, Wilson, Stevens and Howe Creeks were surveyed by California Department of fish and Game during the first round of surveys but were not surveyed by GDRCo during the second and third assessments. The second and third assessments, initiated in 2005 and 2015, were conducted solely by GDRCo on 53 and 51 streams, respectively.

Table 32. Summary of the three habitat typing assessment efforts by HPA.

	1st Assessment 1991-1998		2nd Assessment 2005-2008		3nd Assessment 2015-2018	
HPA	**No. streams**	**Miles**	**No. streams**	**Miles**	**No. streams**	**Miles**
Smith River	4	23.0	7	24.9	7	25.6
Coastal Klamath	22	87.8	17	69.6	16	65.5
Blue Creek	4	21.6	1	4.5	0	0.0
Interior Klamath	11	30.2	3	20.5	3	17.7
Redwood Creek	0	0.0	0	0.0	0	0.0
Coastal Lagoons	0	0.0	7	28.3	8	30.4
Little River	4	18.0	8	23.6	7	25.6
Mad River	3	11.3	3	7.1	3	7.0
NF Mad River	2	18.0	5	21.1	5	20.7
Humboldt Bay	4	14.1	2	13.5	2	13.7
Eel River	4	5.8	0	0.0	0	0.0
TOTALS	**58**	**229.9**	**53**	**213.2**	**51**	**206.2**

Methods and Results

During the initial surveys, channel and habitat typing assessments were conducted using CDFW methods described by Flosi and Reynolds (1994) and during the second and third assessments under the revised CDFW methods described by Flosi et al (2002). The primary changes involved the addition of classifications in some measurement categories, and the upgrade from the DOS-based Habitat 8 program to a Microsoft Access based Stream Habitat program, used for summarization and reporting of results. Refer to The California Salmonid Stream Habitat Restoration Manual, Flosi and Reynolds (1994) and Flosi et al (2002) for a complete description of methodologies. Prior to the onset of assessments, GDRCo’s aquatic field technicians participated in a four-day training seminar sponsored by CDFW in order to become familiar with the methodology. During the channel and habitat assessments the following variables were collected: percent canopy cover, structural shelter for all pool habitats, habitat types as a percent of length, pool-tailout embeddedness and maximum residual pool depths these data are intended to provide information about the health of streams, especially with regard to salmonid habitat, across the California ownership. Summaries of the Long-Term Habitat Assessment monitoring efforts completed to date have been provided in the 1st and 2nd and 7th Biennial Reports (GDRCo 2009; GDRCo 2011a; GDRCo 2021a). No new results are available at this time.

2. LWD Monitoring

Objectives

The importance of Large Woody Debris (LWD) on the health of a stream and its direct relationship to healthy salmonid populations has been well documented. Instream LWD provides cover habitat which benefits salmonids at multiple life stages throughout the year. LWD also interacts with the streambed creating pools and altering the channel in a way that provides fish with improved more complex habitats. These habitats can offer cooler water temperatures and improved cover from predators. The objectives of the project are to document long-term trends in the abundance, size class, species and function of in-channel LWD under the AHCP. The development of potential LWD in riparian areas throughout the Plan Area is relatively predictable. Collectively, the conservation measures are expected to increase potential LWD over the life of the AHCP. However, the recruitment of potential LWD into the stream (i.e., in-channel LWD) is less predictable because it results from highly stochastic processes which occur over long time scales. For this reason, the LWD Monitoring does not lend itself to develop measurable thresholds for adaptive management. This monitoring project will document whether the expected increase of LWD to the riparian areas will result in an increase to in-channel LWD.

This study is integrated into the long-term habitat assessment study and is designed for the same Class I streams to be assessed every ten years. As such, it takes approximately five years to complete each round of assessment. LWD summaries on average piece count and volume per 100 feet were generated to better understand how the conservation measures of the AHCP are performing with regard to LWD within the stream channel.

Project Status

The LWD monitoring program is operational and ongoing. Surveys are initiated on a ten-year interval. The second round of monitoring, conducted from 2005-2009, implemented a modified sampling protocol described in the AHCP (AHCP Appendix D.3.7.2). Details on the differences between the parameters collected and sampling designs were provided in the 2nd Biennial Report (GDRCo 2011a).

The third round of LWD monitoring, similar to the second round, began in 2015 and was completed in 2018.

Methods and Results

Surveys completed during the first assessment utilized the methods described by Flosi and Reynolds (1994). This sampling design was intended to be a more rapid assessment with the objective of quickly identifying stream reaches lacking in LWD for prioritizing restoration projects. LWD was categorized into 8 size classes and then averaged per 100 feet of stream channel. Volume per 100 feet was also calculated for the second and third assessments, but not for the first due to different sampling techniques. Details on function, origin, and total volume were not collected in the 1990's. During 2005 and 2015 the methodologies presented in the revised Flosi et al 2002 were used. This is a survey where pieces are counted, measured, and classified within a given reach (20% surveys) or for the entire anadromous stream length (100% surveys). Regardless of sample design, all LWD ≥0.5 feet in diameter and ≥ 6 feet in length within the sample reach are inventoried. This provides a comprehensive and repeatable measure of abundance, volume, distribution, origin, species and functionality for all in-channel LWD. Live trees and LWD within the "recruitment zone," are no longer included in the surveys.

Summaries of the Long-Term LWD monitoring efforts completed to date have been provided in the 1st and 2nd and 7th Biennial Reports (GDRCo 2009; GDRCo 2011a; GDRCo 2021a). No new results are available at this time.

3. Summer Juvenile Population Estimates

Objectives

The objectives of the summer population estimates are to estimate summer populations of young-of-the-year (YOY) coho salmon, and age 1+ and older (parr) steelhead and cutthroat trout, and to track trends in these populations over time. In the Little River HPA, the population estimate information may be combined with outmigrant trapping data in an attempt to understand the mortality associated with specific life-history stages (particularly over-winter survival). This study is a long-term trend monitoring project, and has no associated thresholds. As enough data are acquired, it will be possible to conduct a trend analysis associated with other monitoring projects discussed in the AHCP.

Project Status

This monitoring program is operational and ongoing. The number of creeks sampled has changed over time from three in 1995 to a high of fifteen through 2014. Currently, there are eleven summer juvenile population estimate monitoring sites established that have been routinely monitored (Table 33). An additional nine sites were briefly monitored but discontinued due to their unsuitability for the study objectives. Additional details on justification for discontinuing these sites were provided in the 2nd Biennial Report (GDRCo 2011a) and 4th Biennial Report (GDRCo 2015a).

The original field protocol has also been slightly modified from the protocol described in the AHCP (AHCP Appendix D.3.8). There have also been modifications to the sampling design and habitat classification over the years as well as to the estimators used to calculate annual salmonid population estimates. An update to the original Summer Juvenile Population Estimate Monitoring protocol was proposed to the Services in the March 2011 request for Minor Modifications. Details and justifications for the requested modifications were provided in the 2nd Biennial Report (GDRCo 2011a). The intent of this request was to update the protocol to reflect the current monitoring efforts being implemented for this project. After review and consideration, the Services concurred with the proposed update to the monitoring protocol. In 2012, the Services were provided with the revised protocol for this monitoring program. No revisions were requested by the Services and the revised protocol has been implemented since.

A functional data management system is established and operational for this project. All historical data has been incorporated into this database and these data have been audited for quality assurance/quality control. Juvenile salmonid population estimates are generated annually using custom reporting functions and the results are reported to NMFS and CDFW in accordance with permit requirements.

On average, the current monitoring sites have been sampled 22.5 times and the monitoring duration has spanned 22.6 years. Wilson Creek and South Fork Winchuck River are the sites with the longest continuous monitoring efforts; both have been monitored for the last 28 years. Detailed information on this project can be obtained from Appendix C which is GDRCo's 2022 Summer Juvenile Salmonid Population Sampling Program annual report to NMFS. This report summarizes the results from the 2022 survey season and compares select variables to historical data.

Table 33. Summary of the summer juvenile population estimate survey efforts conducted by Green Diamond from 1995-2022 (Y = site was surveyed, N = site was not surveyed).

	# Years	Monitoring	Monitoring Year																											
Site Name	**Monitored**	**Duration**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
SF Winchuck River	28	28	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wilson Creek	28	28	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cañon Creek	27	28	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hunter Creek	25	25				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lower SF Little River	25	25				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Railroad Creek	17	17				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Upper SF Little River	25	25				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sullivan Gulch	24	24					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SF Rowdy/Savoy Creel	22	22							Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EF Hunter Creek	14	14									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Heightman Creek	9	10											Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Ah Pah Creek	16	16													Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SF Ah Pah Creek	16	16													Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Little Surpur Creek	11	12																	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Tarup Creek	3	3																		Y	Y	Y	N	N	N	N	N	N	N	N
Moon Creek	3	3													Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
NF Ah Pah Creek	2	2													Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lower Beach Creek	1	1												Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lower Maple Creek	1	1												Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Upper Maple Creek	1	1												Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Number of sites	-	-	3	3	3	6	8	8	9	9	10	10	11	13	15	15	14	13	14	15	15	15	11	11	11	11	11	11	10	11

Blank cells represent years prior to site being developed for survey protocol.

4. Outmigrant Trapping

Objectives

The objectives of the outmigrant trapping project are to monitor the abundance, size, and timing of out-migrating salmonid smolts and look for long-term trends in any or all of these variables. This information may be used to estimate overwinter survival of juvenile coho cohorts by comparing outmigrant abundance to the previous summer population estimates.

Project Status

The outmigrant trapping monitoring program is operational and ongoing. The number of creeks monitored has changed over time. In 1999, three tributaries were selected in Little River followed by a fourth in 2000. In 2004, one additional site was selected in Ryan Creek. In 2015, two sites were discontinued: the site in Ryan Creek and the Railroad Creek site (one of the tributary sites in Little River). In 2015, one additional site was selected on Mainstem Little River, bringing the total to four sites monitored in Little River since 2015.

The original field protocol implemented for this monitoring program is described in the AHCP (AHCP Appendix D.3.9) and has undergone minor changes with the addition of the site on Mainstem Little River and the discontinuation of the Ryan Creek and Railroad Creek sites. An update to the original outmigrant trapping protocol was proposed to the Services in the March 2011 request for Minor Modifications. Details and justifications for the requested modifications were provided in the 2nd Biennial Report (GDRCo 2011a) and the 2011 modifications request, respectively. The intent of this request was to update the protocol to reflect the current monitoring efforts being implemented for this project. After review and consideration, the Services concurred with the proposed update to the monitoring protocol. On July 24, 2012, the Services were provided with the revised protocol for this monitoring program. No revisions were requested by the Services and the revised protocol was implemented for this monitoring program through 2022. As described above, there were changes to the sites monitored for this project as well as a few changes to procedures related to scientific collecting permit limitations.

A database was developed which stores and summarizes data for estimates and reports. All historical data have been incorporated into this database and smolt estimates are generated annually for the sites, the results of which are reported to NMFS and CDFW in accordance with permit requirements. This study is a long-term trend monitoring project and does not have associated thresholds. As enough data are acquired, it will be possible to conduct a trend analysis associated with other monitoring projects discussed in the AHCP.

Currently, four outmigrant trapping sites are established and annually monitored (Table 34). Among these sites, the Mainstem Little River site has been monitored for the shortest period. Detailed information on this project can be obtained from Appendix D which is GDRCo's 2022 Juvenile Salmonid Outmigrant Trapping Program – Little River annual report to NMFS. This report summarizes the results from the 2022 trapping season and compares select variables to historical data.

Table 34. Summary of the outmigrant trapping efforts conducted by Green Diamond from 1995-2022.(Y = site was surveyed, N = site was not surveyed).

			Monitoring Year																							
Site Name	**Watershed**	**# Years Monitored**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Upper SF Little River	Little River	24	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lower SF Little River	Little River	24	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Railroad Creek	Little River	16	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Carson Creek	Little River	23		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mainstem Little River	Little River	8																	Y	Y	Y	Y	Y	Y	Y	Y
Ryan Creek	Ryan Creek	11						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Number of sites		-	3	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4

Blank cells represent years prior to site being developed for survey protocol.

5. Turbidity Threshold Sampling

<u>Objective</u>

In 2022, Green Diamond Resource Company (GDRCo) completed its twenty-first year of Turbidity Threshold Sampling (TTS) at stream locations distributed across the California ownership. This monitoring project began in 2002 at three locations in Little River and in 2007 became part of the Effectiveness Monitoring Program under the AHCP. The purpose of the Effectiveness Monitoring Program is to track the success of the AHCP conservation program in relation to the biological goals and objectives and provide a basis for adaptive management. The objectives of the TTS monitoring stations are to collect continuous stage, continuous turbidity, and water samples (to measure suspended sediment concentration (SSC) throughout each water year (October 1 through July 1). These data can be used to help detect trends that may indicate changes in the levels of erosion at the watershed scale upstream of each station, and to calculate suspended sediment loads by establishing a relationship between SSC and turbidity for a sampling period of interest. These data can also be integrated into existing monitoring projects as hydrologic explanatory variables, including watershed scale assessment of the effectiveness of the mitigation measures of the AHCP especially regarding road building, road upgrading, road decommissioning, timber harvest operations.

<u>Project Status</u>

This monitoring program is operational and ongoing but has been separated from the road-related surface erosion monitoring program (AHCP Section 6.3.5.2.4). This change was approved by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) through a minor modification to the Effectiveness Monitoring Program approved on June 15, 2011. This project was retained as a long-term monitoring project under the Effectiveness Monitoring Program. The TTS monitoring effort began in water year (WY) 2002 at three sites in Little River, was increased to 15 sites during WY 2013 and 2014 and has reduced to 12 sites for the last 8 WYs (Table 35).

Table 35. Summary of the turbidity threshold sampling efforts (Y = yes, protocol implemented) conducted by Green Diamond Resource Company during the 2002-2022 water years.

		Site	# of Years	Water Years Protocol Implemented (20XX)																				
Watershed	Stream Name	Code	Monitored	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Little River	Lower South Fork Little River	LSF	21	Y*	Y*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Little River	Upper South Fork Little River	USF	21	Y*	Y*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Little River	Railroad Creek	RR	13	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
Little River	Carson Creek	CC	20	-	Y*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Humboldt Bay	Ryan Creek	RC-1	12	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
Maple Creek	Mainstem Maple Creek	MSM	18	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Maple Creek	North Fork Maple Creek	NFM	18	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Humboldt Bay	McCloud Creek	MC2	16	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ah Pah Creek	Mainstem Ah Pah Creek	MSAP	15	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ah Pah Creek	North Fork Ah Pah Creek	NFAP	7	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
Ah Pah Creek	South Fork Ah Pah Creek	SFAP2	15	-	-	-	-	-	-	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y
Winchuck River	South Fork Winchuck River	SFW	15	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Redwood Creek	Panther Creek	PAN	3	-	-	-	-	-	-	-	-	-	-	Y	Y	Y	-	-	-	-	-	-	-	-
Klamath River	Tarup Creek	TAR	2	-	-	-	-	-	-	-	-	-	-	-	Y	Y	-	-	-	-	-	-	-	-
Klamath River	Little Surpur Creek	LSUR2	10	-	-	-	-	-	-	-	-	-	-	-	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y
Tectah Creek	East Fork Tectah Creek	EFT	8	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y
Tectah Creek	West Fork Tectah Creek	WFT	8	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y
Number of sites				3	5	5	7	7	8	12	12	12	12	13	15	15	12	12	12	12	12	12	12	12

"-" = monitoring was not conducted (i.e. no data available)
 * = no suspended sediment sampling
Bold indicates when the TTS station was in a different location

As a result of the 2014 land transaction to the County of Humboldt in Ryan Creek, implementation of the pilot project for the riparian modification experiment, and the suspension of sites associated with the outmigrant trapping and single stream juvenile salmonid population estimate studies, 5 TTS sites were suspended following WY 2014. The five suspended sites included one in the Little River HPA (Railroad Creek), one in the Humboldt Bay HPA (Ryan Creek), one in Redwood Creek HPA (Panther Creek), and two in the Coastal Klamath HPA (North Fork Ah Pah and Tarup Creeks). Railroad Creek was discontinued because of suspending outmigrant trapping and single stream estimate surveys at this site. Ryan Creek was discontinued because GDRCo no longer owns the majority of this watershed as a result of a county land transaction and a discontinuation of the outmigrant trapping effort. Monitoring was discontinued at Panther Creek because there were no fisheries monitoring efforts under the effectiveness monitoring program in this watershed. Similarly, NF Ah Pah Creek was discontinued after 2008 because we could not effectively monitor juvenile salmonid populations in this watershed. Tarup Creek has been discontinued because it was originally established as part of the riparian modification experiment, but this watershed was determined to be unsuitable for the study objectives. The two newest sites were established in the Coastal Klamath HPA (East Fork and West Fork Tectah creeks) in WY 2015. These sites were created because the upper Tectah watershed became an experimental watershed replacing Ryan Creek. Monitoring activities are currently ongoing as part of the riparian canopy modification experiment. Nine of the sites monitored during the 2021 and 2022 WYs were located within an experimental watershed. Overall, there were 12 active sites monitored during the 2021 and 2022 WYs. (Table , Figure 12).

Table 36. Summary of the Hydrographic Planning Areas (HPAs) and watershed attributes of the 12 TTS stations monitored during the 2021 and 2022 water years.

Hydrographic Planning Areas (HPAs)	Site Code	Stream name	Watershed area above site - acres (km^2)	Total Watershed Area - acres (km^2)	Average Basin Slope (%)	Basin Relief - feet (m)
Humboldt Bay[1]	MC2	McCloud Creek	1486 (6.01)	1501 (6.08)	30.0	1565 (477)
Little River[2]	CC[3]	Carson Creek	2346 (9.49)	2347 (9.50)	24.2	1368 (417)
	LSF[3]	Lower South Fork Little River	2894 (11.71)	2895 (11.71)	30.4	1585 (483)
	USF[3]	Upper South Fork Little river	3673 (14.87)	3682 (14.90)	31.5	1865 (568)
Coastal Lagoons[1]	MSM	Mainstem Maple Creek	16500 (66.77)	16702 (67.59)	33.5	2325 (709)
	NFM	North Fork Maple Creek	6144 (24.86)	6623 (26.80)	26.2	2159 (658)
Coastal Klamath[1]	EFT[3]	East Fork Tectah Creek	1887 (7.64)	1888 (7.64)	31.4	1502 (458)
	WFT[3]	West Fork Tectah Creek	2045 (8.28)	2060 (8.34)	33.1	1496 (456)
	LSUR2[3]	Little Surper Creek	1661 (6.72)	1679 (6.80)	46.6	1886 (575)
	MSAP[3]	Mainstem Ah Pah Creek	3144 (12.72)	3155 (12.77)	41.2	1851 (564)
	SFAP2[3]	South Fork Ah Pah Creek	1518 (6.14)	1532 (6.20)	44.7	1860 (567)
Smith River[1]	SFW[3]	South Fork Winchuck River	5995 (24.26)	6143 (24.86)	32.2	1800 (549)

[1] Hydrographic area: HPA that encompasses multiple watersheds or a fraction of one

[2] Hydrologic unit: HPA that encompasses the entire drainage

[3] Located within an experimental watershed

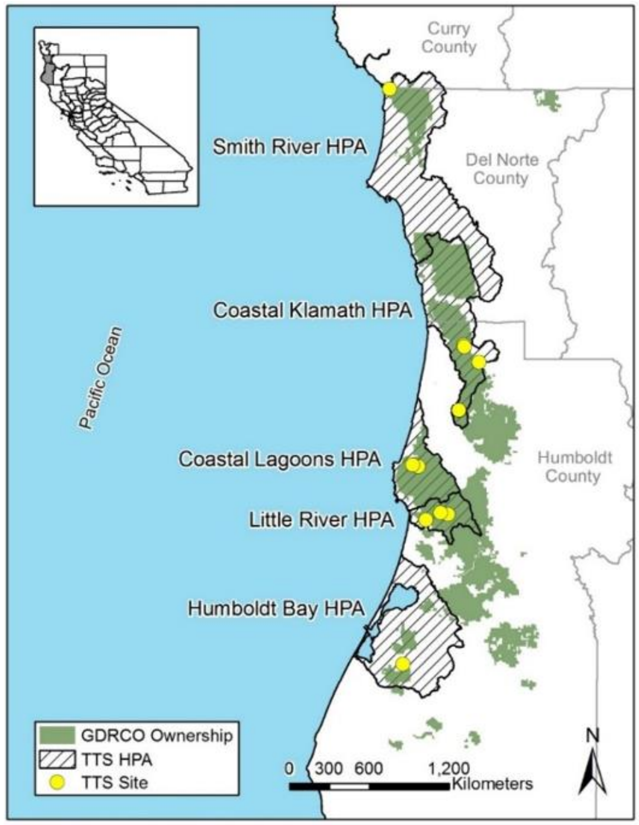

Figure 12. Map of GDRCO ownership, Hydrological Planning areas and locations of the 12 current TTS monitoring sites in Humboldt and Del Norte Counties, California.

Methods

Field Activities

The specifications for the construction and operation of the TTS stations are based on procedures developed by the United States Forest Service Redwood Science Laboratory (Lewis and Eads, 2009). An automated TTS station logs stage height and turbidity at 10-minute intervals for the water year from October 1 to July 1 and determines when a water sample should be taken. A DTS-12 turbidity sensor (Forest Technology Systems, LTD.) measures turbidity in Formazin Nephelometric Units (FNU) and a CS420-L (model PDRC 1830) Druck pressure transducer (General Electric) measures stage height in feet. Corresponding water samples are triggered based on established turbidity thresholds in the data logger program and collected with an ISCO 3700C water sampler (Teledyne ISCO). The datalogger program initiates water samples to be taken based on optimal sampling rates during rising and falling hydrographs (Lewis and Eades, 2001). During field visits, the DTS-2 turbidity sensor is assessed to ensure it is at 6/10 depth for current or anticipated conditions and the optic sensor is inspected to ensure it is free of debris or biofouling. Additionally, electronic stage readings are verified during each field visit with a physical stage plate to the nearest 0.01 feet for accuracy when possible.

Site visits occurred weekly or bi-weekly during which the data from the logger (CR10X, CR800 or CR1000; Campbell Scientific) was downloaded to a tablet for data QA/QC, water samples were collected and transported to the lab and discharge was measured when hydrologic conditions allowed. Discharge was measured in cubic feet per second (CFS) with a Price AA or pygmy current meter (Rickly Hydrological Company) to verify established stage-discharge rating curves and is calculated using the United States Geological Survey's (USGS) midsection method. Discharge measurements are assigned a qualitative grade (good, fair, poor or unusable) based on field conditions and potential problems identified that may affect its reliability. Observations of the monitoring unit's hydrologic controls were also made and included control type (section, channel or combined section and channel) and control condition (clear, magnitude of debris or vegetation and fill or scour control).

Data Management and Quality Assessment

Data files were downloaded from the stations and brought back to the office where site visit observations and water sample data is transferred to a GDRCo server and compiled into a proprietary SQL database. Stage and turbidity time-series data are transferred to Aquatic Informatics' AQUARIUS Time-Series software (*2022)*. Editing, data QA/QC and analysis is performed using the proprietary database, AQUARIUS Time-Series, and Microsoft Excel. Discharge verticals are scrutinized to make sure that 10 percent or less of the total discharge passes through each segment (Turnipseed, D.P., and Sauer, V.B., 2010). Continuous stage and turbidity data are reviewed and graded based on quality and hydrologic conditions. If no edits are needed the data is given a "very good" grade. If the data does require editing, it is assigned a grade between "estimated very good," "estimated good," "estimated fair," "estimated poor," "partial," or "unusable" depending on the required edit to rectify the data. Further, a visual assessment comparing continuous stage and turbidity data was made to determine if there were any increases in continuous turbidity that were not associated with an increase in continuous stage.

Laboratory Processing

Laboratory processing methods were developed and modified based on the Implementation Guide for Turbidity Threshold Sampling: Principles, procedures, and Analysis (Lewis and Eads, 2009). Water samples were preserved with 3-7 drops of a 2 mol HCl solution and analyzed to quantify turbidity and suspended sediment concentration (SSC).

Turbidity (Nephelometric Turbidity-Ratio Units [NTRU]) was measured using a benchtop Hach 2100N turbidimeter (Hach Company, Loveland, Colorado). Each sample is poured into a clear vial, inverted three times to agitate and the highest

NTRU value is recorded. This process is then repeated two more times. The final turbidity value is the average of the three readings. The entire water sample is re-processed If any one of the three readings is greater than 10% of the average.

The samples were then processed for SSC as described in Method D 3977-97 “Standard Test Methods for Determining Sediment Concentration in Water Samples” (ASTM, 2014). As per a modified version of Method D 3977-97, grade B borosilicate glass microfiber filters (Sterlitech Corporation) with a 1.0 μm pore size receive one pre-rinse with distilled water followed by vacuum filtration. They are then oven dried between 103-105 degrees Celsius for a half hour, cooled in a desiccant cabinet, and are weighed to the nearest 0.0001 g. Samples are then agitated and measured for volume to the nearest 5 ml, poured onto the pre-washed filters with vacuum filtration, dried 103-105 degrees Celsius for four hours, cooled in a desiccant cabinet and weighed to the nearest 0.0001 g. The filter containing sediment minus the weight of the pre-rinse filter, divided by the volume equates to the SSC in mg/L.

Stage-Discharge Rating Curve Development

Continuous discharge was derived for each station by establishing a relationship between coinciding stage observations and discharge measurements, or a stage-discharge rating curve. Development of a stage-discharge rating curve in open channels requires that the entire range of flows be captured in discharge measurements, and the number of measurements be sufficient to achieve a high level of accuracy. Enough measurements depend on many things including the experience of the technician, stability of the cross section and rate of change in flow (Lewis and Eads, 2009). Using coinciding stage observations and measured discharges, stage-discharge rating curves were developed and maintained (shifted) using the AQUARIUS Time-Series Rating Development Toolbox (RDT, Aquatic Informatics, 2022) and using best-practice techniques as outlined by USGS (Kennedy, 1984). Generally, high quality discharge measurements were used to establish or verify the base rating, where the control was ‘clear’ and the grade was ‘good’. Depending on how stable the cross section of the monitoring unit is, multiple shifts may be applied to the base rating curve, which adjusts the stage-discharge relationship to reflect the change in control conditions. Shifts to the rating were applied to a period where high-quality discharge measurements deviated from the current rating more than 10% and could be explained by scour or fill conditions of the hydrograph. The stage at zero flow was either estimated based on the data’s associated offsets or were set based on observed stage height at zero flow, when available.

Sediment Load and Sediment Yield Derivations

The relationship between SSC and turbidity can change over the course of the annual monitoring period either between or within storm events (Lewis, 1996). We analyzed individual storm events to establish stronger relationships, and if possible, the relationships of individual rising and falling limbs of storms. SSC data was paired with corresponding turbidity measurements using a set of procedures developed by Jack Lewis at Redwood Sciences Lab (Lewis, 2007) for use within R, a free statistical software package (R Core Team, 2018). This software allows for the construction of turbidity sediment rating curves where relationships between SSC and turbidity can be established on a storm-by-storm basis. Storm periods are defined for those rising and falling turbidities having at least four samples and covering the observed range of turbidity values. Ideally, 4 samples on the rising and 4 samples on the falling limbs would be used. For those storm periods where the sample size was less than 4, they were combined with adjacent storm's samples. The remaining samples that were not defined as part of a storm period are combined into 'base' periods. These periods are represented by low-turbidity samples (usually less than 200 FNU) and may encompass an entire water year or seasonal periods. For sites where individual storms or base periods did not cover the observed range of turbidity values, and sample size for the entire water year was less than 30, the sediment load was estimated using all samples for the year. The best fit relationship for each period was determined to be either linear, power or log-transformed variables after reviewing graphics, R-squared and residual standard error. When log-transformation of the variables is used to predict SSC, the prediction must be retransformed back to the original units, and that step introduces a bias (Miller, 1984; Koch and Smillie, 1986). To correct for this bias, the minimum-variance unbiased estimate (MVUE) was used. Once relationships were established, the software produced a derived SSC time-series data set using the turbidity time-series as the input. The derived SSC data set was then multiplied by the derived continuous discharge data produced by a standard stage-discharge rating curve. The resulting data set gives instantaneous Suspended Sediment Load (iSSL) estimates for every 10-minute interval for the water year. From here, the data is multiplied by 600 seconds (10 minutes) and summed to produce an annual suspended sediment load (SSL, kg). The annual SSL is then converted to metric tons and standardized to the watershed area to produce an annual sediment yield in metric tons/km^2/year. Each storm and annual sediment load are estimated with a coefficient of variation (CV%) indicating the variance of the estimated SSL.

Results

The largest observed flows occurred from mid-December to mid-February in WY 2021 and in mid-December to early January in WY 2022 for all sites. The largest observed field turbidities generally occurred during the largest peak flows, which is expected since turbidity and suspended sediment is primarily discharge-driven. The largest observed field turbidity observed during the 2021 and 2022 WY was 1280 and 601 FNU, respectively and both occurred at the McCloud Creek monitoring station (MC2). The total number of discharge measurements collected was 136 and 316 for the 2021 and 2022 WYs, respectively. The total number of water samples collected, including automated and manual samples, was 1078 and 842 for the 2021 and 2022 WYs respectively. Of these, 613 and 566 were automated samples processed for lab turbidity, and 481 and 496 samples were processed for SSC for the 2021 and 2022 WYs. Estimated sediment yields ranged from 9.15 to 107.50

metric tons/km^2/year for the 2021 WY and from 4.35 and 17.65 metric tons/km^2/year for the 2022 WY (Table 37). Sediment yield was less in WY 2022 than in WY 2021 across all twelve sites.

Table 37. Annual sediment yield (metric tons/km^2/year, CV%) for 12 TTS stations for the 2021 and 2022 WYs.

	Suspended Sedimet Yield (metric tons/km^2/year, CV%)	
Site	WY 2021	WY 2022
MC2	25.56 (1.28%)	17.45 (2.27%)
CC	9.15 (1.74%)	4.84 (2.39%)
LSF	19.93 (4.20%)	6.73 (6.14%)
USF	12.81 (5.10%)	5.65 (5.49%)
MSM	20.64 (4.45%)	7.61 (9.55%)
NFM	21.66 (7.10%)	4.35 (11.97%
EFT	20.45 (4.46%)	17.65 (8.01%)
WFT	10.43 (3.02%)	6.36 (8.33%)
LSUR2	14.42 (3.54%)	9.59 (10.68%)
MSAP	31.71 (2.73%)	12.55 (8.39%)
SFAP2	21.21 (4.05%)	8.06 (5.32%)
SFW	107.50 (1.92%)	13.35 (3.71%)

Discussion

Water year 2022 concluded the third consecutive year with below average rainfall throughout the coastal California region (NOAA CNRFC Precipitation Summary Records were accessed from https://www.cnrfc.noaa.gov/ol.php?type=precip). Most sites experienced the lowest or second lowest water yield in the 2022 WY for the duration that they have been monitored. In general, the southern sites tended to experience less rainfall and more variability in any given year due to prevailing rainfall patterns that typically originate in the north and vary in extension to the south of the region. During the monitoring periods in WYs 2021 and 2022, the most northern extent of our sites received about 2-3.5 times as much rainfall (Brookings, OR Weather station) than for the southern extent of the monitoring sites (Woodley Island Weather station, Eureka; National Weather Service).

This study is a long-term trend monitoring project and does not have associated thresholds. As enough data are acquired, it will be possible to conduct trend analyses associated with other monitoring projects discussed in the AHCP. While sediment yields provide useful information when comparing across sites within a water year, temporal patterns will provide insight into cumulative effects to suspended sediment loads from activities occurring across the landscape. Additionally, this will allow us to assess trends in suspended sediment load since the implementation of the AHCP and assess effectiveness since its implementation in 2007. This includes assessing trends in flow-normalized sediment loads. Suspended sediment is primarily discharge driven and thus it accounts for the greatest variability in sediment load. Thus, to effectively assess any trends in sediment yield over time, we must normalize sediment yield by streamflow. Additionally, this method will allow sediment loads to be assessed in relation to other explanatory variables such as those that describe baseline geologic conditions in each watershed or road or harvest-related activities.

A data management system (Aquarius 3.10) was acquired in 2016 for this monitoring program. The major advantages of this database are that it combines field and lab data into one database, allows for a continuous plotting and analysis of multiple water years, and provides more user-friendly rating development tools. All past field and lab data have been incorporated into this database and quality assurance/quality control assurances are complete. A software upgrade in May 2019 (v.2019.1) resulted in a loss of functionality for rating development. These issues carried over into subsequent versions. We are currently utilizing version 2022.2 which was implemented in August 2022. GDRCo's aquatic program staff are currently working directly with the Aquarius software development team to resolve these issues and ensure that the new rating development tool will provide the functionality that meets the objectives of our TTS monitoring program. This new rating development tool has been released and GDRCo staff is currently beta testing its capabilities for implementing our suspended sediment load calculation workflow. Until the final version of the new rating development tool is released, GDRCo's aquatic program staff derived continuous suspended sediment concentration using a set of R code developed by Jack Lewis as described in the methods herein. Prior to the start of the 2022 WY, the hydrology program upgraded from handheld PCs to tablets and from direct to wireless datalogger connection. This also included the development of a new data collection form for recording field visit data using the Fulcrum application, a mobile data collection platform. The new data collection platform has been incorporated into all GDRCo proprietary database management systems and all database import routines are operational. This upgrade in technology has allowed for more efficient data downloads and less error in transferred data files.

D. Experimental Watersheds

While the majority of the AHCP's monitoring projects will be conducted throughout the Plan Area, experimental watersheds judged to be representative of the different geologic and physiographic provinces across the Plan Area have been specifically designated where additional monitoring and research on the interactions between forestry management and riparian and aquatic ecosystems will be conducted. Those watersheds are the Little River (Little River HPA), South Fork Winchuck River (Smith River HPA), and Upper Tectah Creek, Little Surpur Creek, and Ah Pah Creek (Coastal Klamath HPA).

As stipulated in AHCP Section 6.2.5.4, the program will entail:

- Effectiveness monitoring projects and programs that due to their complexity and expense of implementation can only be applied in limited regions (these include turbidity monitoring, Class III sediment monitoring, and road-related mass wasting monitoring;

- Studies related to harvested and non-harvested areas, allowing for more effective evaluation of conservation measures and increased understanding of the effects of forest management on the habitats and populations of the Covered Species.

- Studies of conservation and management measures, allowing for a refinement of measures and an assessment of the relative benefits of different measures under the AHCP; and

- Development and implementation of new or refined monitoring and research protocols.

Below is a summary of the studies or pilot studies, past and present, which have been carried out in an Experimental Watershed.

<u>SF Winchuck River Watershed</u>
- Property Wide Water Temperature Monitoring
- Class II BACI Water Temperature Monitoring
- Class I Channel Monitoring

- Long Term Habitat Assessment Monitoring
- LWD Monitoring
- Summer Juvenile Salmonid Population Estimates
- Turbidity Threshold Sampling (TTS) monitoring

<u>Ah Pah Creek Watershed</u>
- Property Wide Water Temperature Monitoring
- Class I Channel Monitoring
- Long Term Habitat Assessment Monitoring
- LWD Monitoring
- Summer Juvenile Salmonid Population Estimates
- Turbidity Threshold Sampling (TTS) monitoring
- Riparian Canopy Modification Experiment

<u>Upper Tectah Creek Watershed (watershed added per Minor Modification; GDRCo 2017)</u>
- Property Wide Water Temperature Monitoring
- Turbidity Threshold Sampling (TTS) monitoring
- Riparian Canopy Modification Experiment

Little Surpur Creek Watershed (watershed added per Minor Modification; GDRCo 2017)

- Property Wide Water Temperature Monitoring
- Long Term Habitat Assessment Monitoring
- LWD Monitoring
- Summer Juvenile Salmonid Population Estimates
- Turbidity Threshold Sampling (TTS) monitoring

Little River Watershed

- Property Wide Water Temperature Monitoring
- Class II BACI Water Temperature Monitoring
- Tailed Frog Life History Monitoring
- Class I Channel Monitoring
- Class III Channel Monitoring
- Long Term Habitat Assessment Monitoring
- LWD Monitoring
- Summer Juvenile Salmonid Population Estimates
- Outmigrant Trapping
- Turbidity Threshold Sampling (TTS) monitoring
- BACI Class II RH Cross Section Monitoring

Ryan Creek Watershed (watershed removed per Minor Modification; GDRCo 2017)

- Property Wide Water Temperature Monitoring
- Class III Channel Monitoring
- Outmigrant Trapping *
- Long Term Habitat Assessment Monitoring
- LWD Monitoring
- Turbidity Threshold Sampling (TTS) monitoring *

The development and implementation of new research and monitoring protocols will provide an opportunity for GDRCo to refine existing conservation measure to make them more effective and efficient. This will include state-of-the-art existing study designs along with original research approaches that will require the input from academic, agency, and private scientists.

1. Riparian Canopy Modification Experiment

GDRCo has been in the process of developing a watershed level experiment since shortly after the approval of our AHCP in 2007 in conjunction with numerous collaborators including Humboldt State University, Oregon State University, USGS, U.S. Forest Service, California Department of Fish and Wildlife (CDFW), CALFIRE and others. The conceptual framework for the experiment is focused on the response of stream systems to modifications of the riparian canopy that would increase the amount of solar radiation reaching the stream. The fundamental premise is that increases in sunlight will increase primary productivity in the stream ecosystem. A field experiment was designed and implemented to test effects of modifications to the riparian canopy on primary productivity as measured by fish and amphibian abundance and growth while at the same time minimizing negative impacts to aquatic life or water quality.

The potential that riparian canopy modifications may increase stream productivity is based on prior studies suggesting that light limitation of primary production often overrides nutrient limitation in small, forested streams (e.g., Lowe et al. 1986; Rand et al. 1992; Hill et al. 2001). This may be particularly common in the Pacific Northwest, where both coniferous vegetation and an increasing dominance of alder (Alnus spp.; Hu et al. 2001) can provide heavy riparian shade. In coastal settings in northern California, summer fog also reduces light reaching streams. Where light limits algal production, the ability of stream systems to respond to nutrient enrichment such as adding salmon carcasses may be affected and transfer pathways to salmonids may be restricted. Autotrophic pathways are particularly important in sustaining salmonid growth during spring and summer (Bilby and Bisson 1992) and are at the basis of the finding that logged streams often support higher salmonid production than their forested counterparts (e.g., Murphy and Hall 1981; Wilzbach et al. 1986).

The potential benefit of additional sunlight to resident salmonids has already been demonstrated by Wilzbach et al. (2005) in north coastal California. They conducted an experiment in which 100-m stream reaches were treated with complete removal of deciduous canopy to increase solar radiation. Half of these reaches were also treated with additions of salmon carcasses to increase nutrient levels. There was no measurable effect from the carcass additions on the initial and a follow-up study (Harvey and Wilzbach 2010), but removal of the riparian canopy had a strong positive impact on salmonid biomass, density, and growth. However, the implications from this study are limited to the stream reach scale, and what is lacking is additional experimentation to determine if similar results can be achieved at the stream or watershed scale.

The potential benefits of increased sunlight on a stream are not limited to fish species. Increases in primary productivity that indirectly benefits salmonid species through increases in the aquatic invertebrate fauna should also indirectly benefit many stream associated headwater amphibians. In addition, tailed frogs can be directly impacted since the larvae are benthic grazers that feed on unicellular algal periphyton. In two small coastal streams in British Columbia, Mallory and Richardson (2005) documented an increase in larval tailed frog growth with experimental increases in light, but no affect from nutrient additions.

Active management of second-growth stands to accelerate the acquisition of mid to late-seral characteristics using silvicultural treatments has also recently emerged as a top priority in forest parks and reserves in northern coastal California (Porter et al. 2007; Keyes et al. 2010; O'Hara et al. 2010). For example, Redwood National Park recently completed an Environmental Assessment and Finding of No Significant Impact to thin 1,125 acres in the Middle Fork Little Lost Man Creek watershed (RNP

2014a and RNP 2014b). In contrast, little attention has been given to achieving similar management goals on private managed timberlands. Compared to late-seral stand condition, second-growth riparian stands typically have a much higher stem density with a shift to a greater proportion of red alder *(Alnus rubra*) and Douglas-fir (*Pseudotsuga menziesii*) and fewer redwoods (*Sequoia sempervirens*) (Keyes and Teraoka 2014). In addition to potentially increasing productivity in the aquatic environment, there are similar opportunities to restore and enhance tree species composition and size in the near stream riparian environment.

Although there is increasing evidence supporting the need for watershed level experiments, the complexity of initiating a long term study of this spatial extent with the potential for negative impacts raises many legitimate concerns that need to be overcome with small incremental steps. As a result, we initiated a pilot study (see Section VIII.D.2 below) with the fundamental goal of determining the feasibility of expanding the study to a larger scale watershed level experiment. Following the successful implementation of the pilot study, we initiated a watershed scale study in upper Tectah Creek to look at how changes in riparian canopy affects stream shading, light, water temperature, trophic pathways, and the growth and bioenergetic responses of cutthroat trout (see Section VIII.D.3 below for more details). Coupled with this project was a study conducted by CDFW designed to look at how different levels in riparian thinning affect the long-term development of different size classes of trees, snags and dead wood (see Section VIII.D.4 below for more details). More recently, GDRCo hosted another larger scale watershed level experiment that was funded by the Effectiveness Monitoring Committee (EMC) of the California Board of Forestry and Fire Protection (Board), to assess the effectiveness of the Board's recently enacted Forest Practice Rules (FPR) for Class II-L watercourses. In addition to evaluating the FPR Class II-L prescription this study was also designed to evaluate the AHCP Class II-2 prescriptions which are similar to the Class II-2 watercourses in their biological and geological attributes (see Section VIII.D.5 below for more details).

2. Pilot Project: SF Ah Pah Creek

<u>Objectives</u>

A pilot study was initiated on a single stream reach with several objectives. We evaluated the feasibility of marking and removing riparian trees as part of a timber harvest operation to achieve an approximate 50% overstory canopy cover post-harvest. We also monitored the treated reach to determine if there was any evidence of bank erosion or measured increases in turbidity/suspended sediments or any biologically significant increases in water temperature in the treatment or downstream reaches relative to the water entering the upstream portion of the treatment reach. Although the primary objectives were related to the physical variables, prior to conducting the treatment (i.e., felling of riparian canopy trees), we also captured and marked juvenile cutthroat and steelhead trout and coastal giant salamanders to test field methodologies and to provide an opportunity to record movements and growth. The data collected on the physical variables with potential for negative impacts were evaluated from this pilot treatment to ensure that treatment of additional stream reaches associated with watershed level experiments was warranted and unlikely to produce negative biological impacts.

Project Status

The pilot study was located on GDRCo's ownership in the South Fork (SF) Ah Pah Creek sub-basin that drains into the Lower Klamath River Basin. The single riparian treatment was conducted on an approved Timber Harvesting Plan (GDRCo # 56-1302; CalFire # 1-13-106HUM, Unit B) in SF Ah Pah Creek (Figure 13). The riparian management zone (RMZ) along the west side of the mainstem SF Ah Pah Creek in Unit B was marked by a forester to achieve approximately 50% overstory canopy after the trees were felled and yarded out of the RMZ. Trees marked for harvest

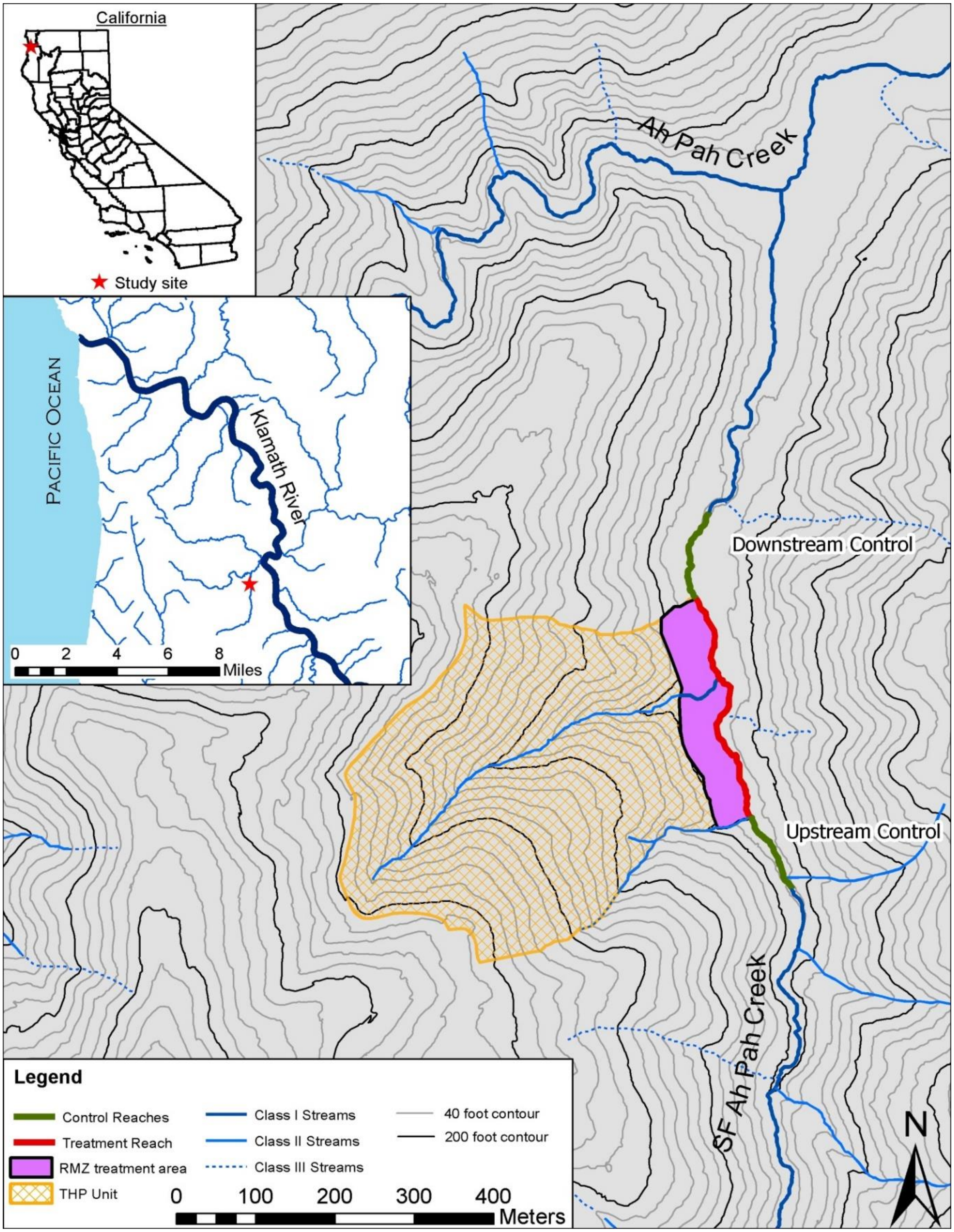

Figure 13. Overview map of treatment area and study reaches associated with the Pilot Project in SF Ah Pah Creek.

included alder, maple, bay, tanoak, hazelnut, and cascara. The marked trees with commercial value were yarded out of the RMZ, wherever feasible. Felling of the harvest unit was completed on March 31, 2015 and yarding was completed by April 3, 2016.

The stream reach immediately upstream of the treated RMZ served as a control for all the physical variables recorded in and immediately downstream of the treated reach. A 100-m reach immediately above and below the treated reach served as biological control areas for recording movement and growth response of marked juvenile cutthroat and steelhead trout and coastal giant salamanders (Figure 13).

Habitat mapping and animal sampling occurred in August 2014 and February 2015 to assess pre-treatment fish growth rates during what was believed to be a low growth rate period (Late fall / Early winter) (Figure 13). Post-treatment data collection occurred bimonthly from May 2015 until February 2018 (Figure 13).

Hemispherical photographs were taken in September 2014 (during leaf-on conditions) and January 2015 (during leaf-off conditions) to assess pre-treatment canopy closure and solar radiation in the control and treatment reaches (Figure 13). Post-treatment, from fall of 2015 to spring of 2018, there were six rounds (3 leaf-on and 3 leaf-off) of hemispherical photographs taken. Photographs are processed and analyzed using Hemi-View 2.1 software (Dynamax Inc., 1999).

Two of GDRCo's summer water temperature sites, one upstream (Ah_Pah_SF_(Yurok)) and one downstream (Ah_Pah_SF_(rock_pit)) of the treatment reach, have been monitored for 13 years and 10 years, respectively. (**Error! Reference source not found.**). In 2014, as part of a graduate student project from HSU (Wick 2016), 12 additional summer water temperature sites (Ah_Pah_SF_4 through Ah_Pah_SF_15) were deployed to get a finer detailed assessment of water temperature conditions prior to treatment within the project area (**Error! Reference source not found.**). All 14 of these sites were also monitored from 2015 through 2018 to assess water temperature conditions post-treatment.

Water quality characteristics (stage, discharge, turbidity and suspended sediment concentration) have been monitored from water year 2008-2015 (October – September; WY) downstream of the treatment reach as part of GDRCo's annual monitoring. This same monitoring was also conducted in WY 2016 and 2017 to assess any differences post-treatment. The site was moved upstream approximately 340 feet due to changes in the channel configuration that compromised the quality of data collection at the previous site. Additionally, starting in WY 2017, "forensic turbidity sampling" was conducted following any three-inch cumulative rain event that occurred in a 24-hour period to determine if any

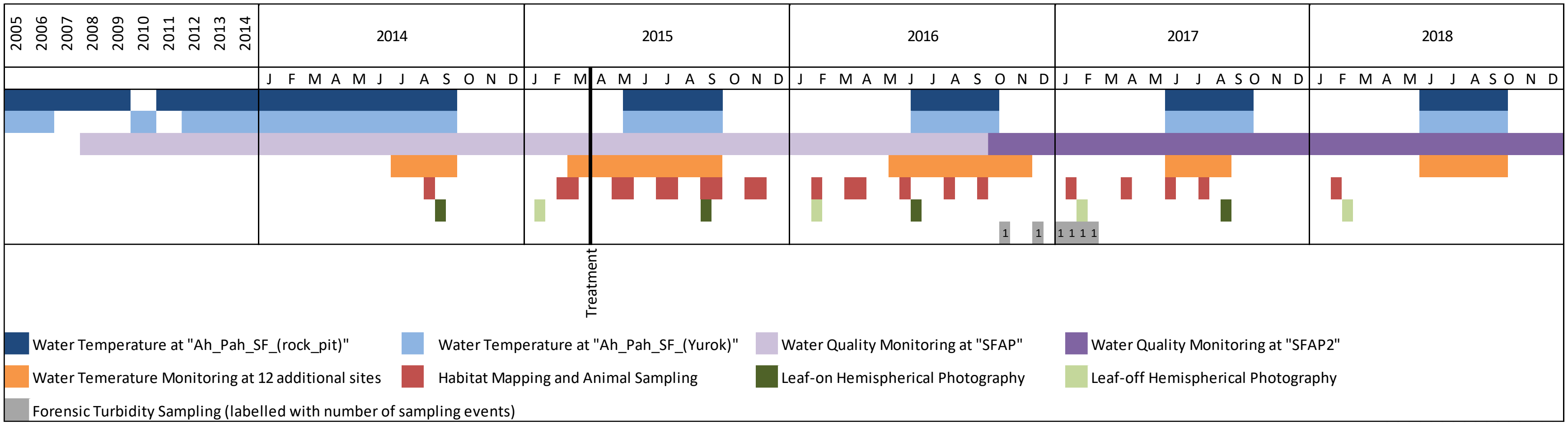

Figure 14. Chronological summary of key monitoring activities associated with the Pilot Project in SF Ah Pah Creek. From 1995 through 2014, the water temperature monitoring was generally conducted from April to October.

post-treatment effect could be detected at the site scale (Figure 14). For each forensic turbidity sampling, water samples were collected manually from 9 stations whenever the three-inch rainfall threshold was met.

Some preliminary results and observations from this pilot project were presented in the 6th Biennial Report (GDRCo 2019) and were reviewed with the Services. The Services were satisfied with these preliminary results to justify proceeding with the watershed level experiments in Class I watercourses (see the Tectah Creek Riparian Canopy Experiment in Section VIII.D.3.) and Class II watercourses (see the Effectiveness of Class II Riparian Prescriptions in Section VIII.D.4.). GDRCo is planning on presenting these data at the 40th Annual Salmonid Restoration Conference on April 28, 2023 in Fortuna California.

3. Tectah Creek Riparian Canopy Experiment

The Tectah Creek Riparian Canopy Experiment is a watershed level project located on GDRCo's ownership in Tectah Creek, tributary to the Lower Klamath River Basin. The riparian treatment areas were incorporated into a Timber Harvesting Plan (GDRCo # 56-1601; CalFire # 1-16-091HUM) in Upper Tectah Creek (Figure 22). The target overstory canopy retention level post-harvest within the treatment reaches was 50%. Based on information learned from the pilot project in SF Ah Pah Creek, canopy was removed along both sides of the stream in each treatment reach to ensure adequate solar radiation reached the stream to observe a treatment response. Trees marked for harvest included alder, maple, tanoak, madrone, Douglas-fir, redwood, and hemlock. The marked trees with commercial value were yarded out of the RMZs, wherever feasible. Stream reaches immediately upstream of the experimental RMZs served as the control for each harvest unit and the stream reach immediately downstream of the treated RMZs served as the downstream response for each harvest unit (Figure 15). Monitoring associated with this experiment was conducted in conjunction with a research project by David Roon (PhD candidate from Oregon State University), whose dissertation research also included studying the riparian thinning restoration that was conducted along Middle Fork Lost Man Creek in Redwood Nation Park.

<u>Objectives</u>

The objectives of the study are to 1) determine how changes in canopy cover and light associated with riparian thinning will affect thermal regimes within the stream network, 2) determine how stream food web structure shifts to changing riparian canopy conditions associated with the experimental thinning treatments, 3) determine if thermal or trophic pathways are responsible for driving potential changes in growth, production, and bioenergetics for cutthroat trout, and 4) evaluate cumulative watershed effects associated with riparian thinning for aquatic ecosystems using a food web system dynamics model. David Roon's research proposal was provided in Appendix D of the 5th Biennial Report (GDRCo 2017).

Project Status

Pre-treatment data collection for the project began in 2015 and 2016. Felling and yarding activities of the harvest units were completed during 2017. Post-harvest data collection began during late summer 2017 and was completed during the fall of 2018. Current activities are focused on data analysis and writing.

Dave Roon's dissertation on the Tectah Creek riparian experiment was submitted on June 24th, 2021. The dissertation included four chapters:

- Chapter 1: General Introduction

- Chapter 2: Shade, light and stream temperature responses to riparian thinning in second-growth redwood forests, Northern California.

  This chapter evaluates the reach-scale responses of riparian shade, light, and stream temperature to riparian thinning. Stream thermal responses were characterized seasonally and across multiple components of the thermal regime.

  This chapter was published in PLoS ONE: Roon et al. 2021 Shade, light, and stream temperature responses to riparian thinning in second-growth redwood forests of northern California.

- Chapter 3: A riverscape approach reveals downstream propagation of stream thermal responses to riparian thinning at multiple scales.

  This chapter evaluates the watershed-scale patterns in stream temperature in response to riparian thinning. It evaluates the temporal duration and spatial extent of local and downstream temperature responses to riparian thinning across multiple spatial and temporal scales.

  This chapter was published in Ecosphere: Roon et al. 2021 Ecosphere a riverscape approach reveals downstream propagation of stream thermal responses to riparian thinning

- Chapter 4: Effects of riparian thinning on trophic pathways supporting stream food webs in second growth redwood forests of Northern California.

  This chapter evaluates the effects of riparian thinning on the trophic pathways supporting stream food webs. It evaluates how increases in light associated with thinning influences stream food webs and combines data on stream periphyton, macroinvertebrates in the diets of coastal cutthroat trout and coastal giant salamander, and stable isotopes.

This chapter was published in Ecosphere: Roon et al. 2022 Influence of riparian thinning on trophic pathways supporting stream food webs in forested watersheds

- Chapter 5: Effects of riparian thinning on growth and energetics of coastal cutthroat trout in forested streams at reach and watershed scales.

  This chapter evaluates whether changes in temperature or prey resources associated with thinning influenced growth and bioenergetic responses by coastal cutthroat trout. This chapter will combine results from the previous chapters with growth data and bioenergetics modeling.

  Data analysis and writing for this chapter is ongoing. This chapter is expected to be submitted to a journal for peer-review during 2023.

David Roon has presented this research at a variety of scientific meetings and symposiums in 2021 and 2022:

- Stream food web responses to riparian thinning in second-growth redwood forests

\- PNW chapter of the Society for Freshwater Sciences, virtual, 10/27/2021

\- Society for Freshwater Sciences annual meeting, virtual, 05/26/2021

\- Oregon chapter of the American Fisheries Society meeting, virtual 03/03/2021

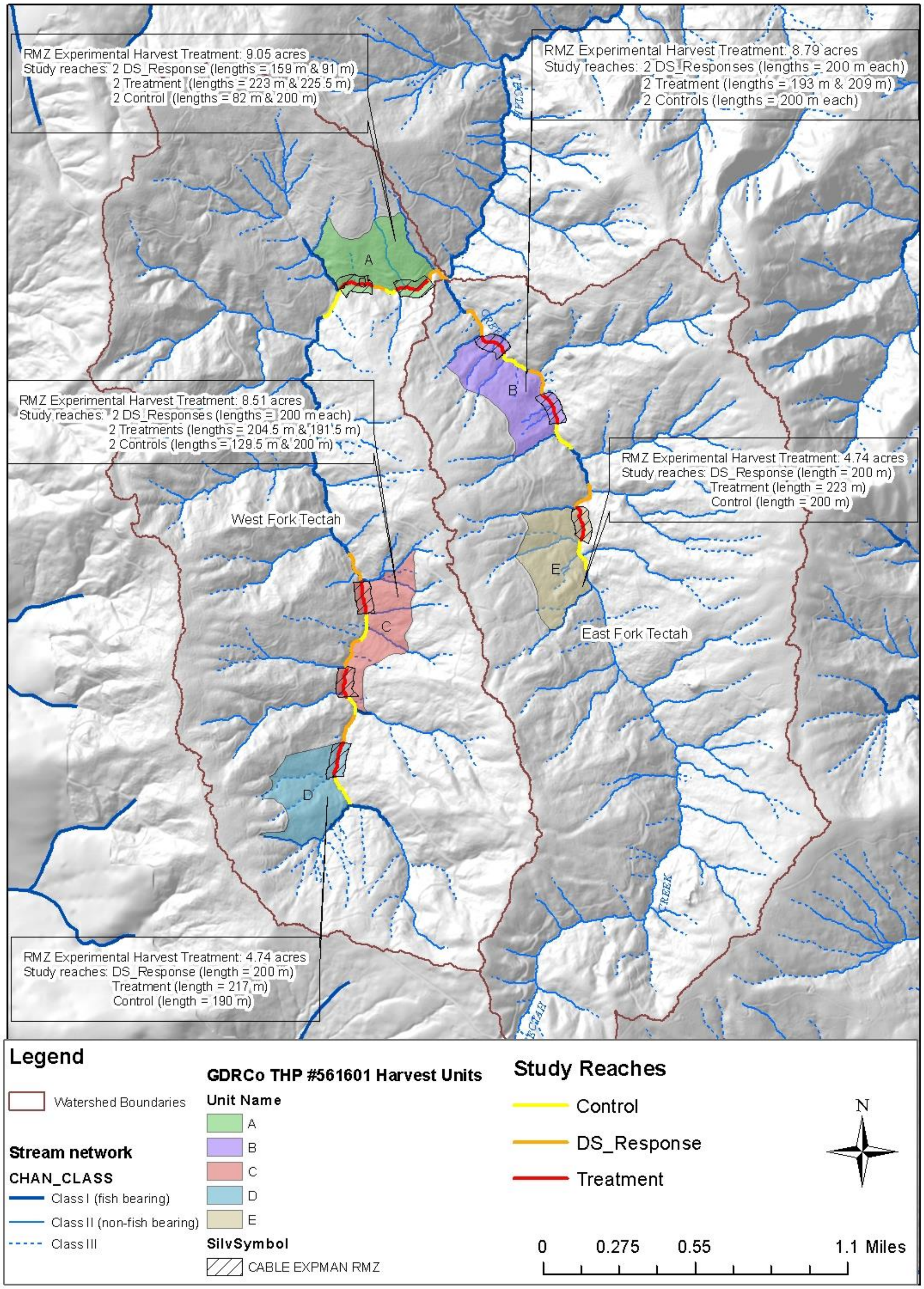

Figure 15. Map of experimental thinning treatments in Upper Tectah Creek.

4. Forest Growth Modeling of Tectah Creek Experimental Riparian Thinning Treatments

The original study design of the Tectah Creek Riparian Canopy Experiment did not include provisions to evaluate the effects of riparian thinning on the promotion of late seral habitat for terrestrial wildlife species. To fulfill this objective California Department of Fish and Wildlife proposed and initiated a project in conjunction with the Tectah Creek Riparian Canopy Experiment to evaluate how the riparian thinning treatments associated with this study might affect the long-term development of large-diameter live trees, snags, and dead wood. Stand plots (60 foot radial) were established randomly within one of each riparian thinning treatment for each harvest unit. The plots were surveyed during the late summer of 2016 (pre-harvest) and again post-harvest during the summer of 2017. The survey protocols used were based on US Forest Service (USFS) Forest Inventory and Analysis Program Manual (USDA 2016). The plot inventory data were analyzed using the USFS Forest Vegetation Simulator (FVS) (Keyser 2016) to simulate the forest stand development of the treatments for standing, snag and downed wood diameter distributions over a 200-year time period. There were a total of 8 plots modeled using FVS; four plots received standard AHCP Class I prescriptions which included 85% overstory canopy cover within the inner 50-70 foot zone and 70% canopy covers within the remaining outer zone (AHCP Sections 6.2.1.1 and 6.2.1.2) and four plots received the experimental thinning treatment of 50% overstory canopy cover.

<u>Project Status</u>

CDFW has completed a final report: Nicolas Simpson 2022, California Department of Fish and Wildlife submitted to California Natural Resources Agency. Using a Forest Growth Model to Evaluate Effects of an Experimental Riparian Thinning Treatment on Diameter Distribution, Stand Density, and Dead Wood, Along a Northern California Stream.

5. Effectiveness of Class II Riparian Prescriptions

Green Diamond agreed to host a study, which was conceived, initiated and principally funded by the Effectiveness Monitoring Committee (EMC) of the California Board of Forestry (Board), to assess the effectiveness of the Board's recently enacted California Forest Practice Rules for Class II-L watercourses (14 CCR § Section 916.9). In their biological and geological attributes, State Class II-L watercourses are similar to Class II-2 watercourses outlined in AHCP Section 6.2.1.3. The experiment is being conducted on GDRCo property within tributaries of the Lower Klamath River watershed.

The proposed study reaches and the proposed treatments were reviewed with the Services on August 27, 2019. A letter was submitted to the Services on September 3, 2019 requesting concurrence to conduct the project under AHCP Section 6.2.54 of the Experimental Watersheds Program. On October 24, 2019, the Services provided written concurrence for the study design related to the number and location of study sites, the experimental treatments allocated to each site, including untreated controls, and the grouping of study sites for replication. The majority (12 of 18) of the proposed study sites are located within the designated Experimental Watersheds established in AHCP Section 6.2.5.4. Due to difficulties in obtaining adequate sample sizes and replication, 6 of the 18 study sites were located outside of the Experimental Watersheds; however, the treatments associated with these 6 study sites provide protections that are greater than or equal to the protections of Class II-2 watercourses provided for in AHCP Section 6.2.1.3. The full study proposal for this experiment is included in Appendix E.

Objectives

The objectives of this experiment are to evaluate if the current Class II riparian requirements/regulations are effective at maintaining, protecting, and restoring (a) canopy closure, (b) stream water temperature, and (c) primary productivity. It is also to examine what stream and riparian forest characteristics are important for determining effectiveness of the RMZs. A Before-After Control-Impact (BACI) study design is being utilized. Multiple Class II-2 (Class II-L) stream reaches are instrumented to evaluate RMZ stand structure, canopy closure, upstream/downstream water temperature, and primary productivity response under varying riparian prescriptions.

Project Status

This project is operational ongoing. Preharvest data was collected during 2019-2020 and post-harvest data collection occurred during 2021-2022.

Oregon State University master's student Jonah Nicholas defended his thesis in December 2022: Riparian effects on headwater streams: Changing summer flow after harvests in coastal Northern California.

There are draft manuscripts in progress on the Class II stream temperature, harvest effects on stream temperature and primary productivity and nutrient data.

E. Protocol Updates

As allowed under the AHCP Program Flexibility (AHCP Section 6.3.5.1.1), monitoring techniques and related technology are expected to change significantly through the life of this Plan. Some monitoring approaches may be retired or replaced by more efficient and/or accurate techniques to address the same issue, and entirely new approaches may be implemented to address currently unforeseen issues. Since implementation of the Plan, modifications to some of the effectiveness monitoring field protocols have occurred. To help track the field protocol changes that have occurred to date and in the future, a summary was compiled (**Error! Reference source not found.**) and will be updated biennially.

Table 38. Summary of effectiveness monitoring protocol updates (Y = yes, N = no; field protocol modified) since AHCP implementation.

Monitoring Project Type	Project Type	Years Protocol Updated															
		2007	2008	2009	2010	2011[1]	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Rapid Response Monitoring	Headwaters Monitoring - Tailed Frog	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
	Headwaters Monitoring - Torrent Salamander	N	N	N	N	Y	N	N	N	N	N	N	N	Y[3]	N	N	N
Response Monitoring	Class I Channel Monitoring	N	N	N	N	Y	N	N	N	Y[2]	N	N	N	N	N	N	N
	Class III Sediment Monitoring	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
Long-term Trend Monitoring/Research	Summer Juvenile Salmonid Population Estimates	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
	Out-migrant Trapping	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
	10 Year Tailed Frog Occupancy Survey	N	N	N	N	N	N	N	N	N	N	N	N	Y[4]	N	N	N
	10 Year Torrent Salamander Occupancy Survey	N	N	N	N	N	N	N	N	N	N	N	N	Y[4]	N	N	N

[1]Updated protocols provided as appendices in the third biennial report.

[2]Updated protocols were approved by the Services on ??? This included discontinuing the collection of cross sectional data.

[3]Updated protocols were approved by the Services on ???. This included sampling every sites every other year to minimized habitat degradtion associated to survey effort.

[4]A minor modification to change the property wide amphibian headwaters surveys from abundance to occupancy surveys was submitted to the Services on April 27, 2018 and was approved for use starting in 2019. Additionally, tailed frog occupancy surveys incorporated environmental DNA (eDNA) sampling as a component of the survey.

IX. Adaptive Management Account

The AHCP was designed to be adapted over time as GDRCo learns new information through triggering of a yellow or red light condition determined through on-going monitoring, slope stability monitoring, or through the outcome of a designed experiment in one or more of the Experimental Watersheds. As described in AHCP Section 6.2.6, adaptive management changes will be subject to the availability of the Adaptive Management Reserve Account (AMRA) and limited to changes in RMZs, SMZs and specific road management plan prescriptions. The opening balance of the AMRA was set to 1,550 Fully Stocked Acres. There were no debits or credits made to the AMRA balance during this reporting period. The balance of the AMRA, as of December 31, 2022, is 1,550 Fully Stocked Acres. Any debits and credits will be tracked on an on-going basis and the account will be summarized and updated in each biennial report.

X. Changed Circumstances

The AHCP Conservation Program was designed within the context of the forestland ecosystems in the Plan Area. These ecosystems are dynamic rather than static; they are regularly impacted by various natural physical processes that shape and reshape the habitat for the affected species that occupy those areas. The aquatic species for whose conservation the AHCP was crafted evolved in close association with this ever-changing mosaic of natural physical elements.

The natural physical processes that affect the biodiversity and landscape ecology are usually of moderate intensity and relatively confined in geographic extent and magnitude of impact. Nonetheless, natural physical processes have on occasion been of catastrophic intensity, particularly from the standpoint of impact to individual plants and animals. That these natural physical processes can significantly alter aquatic and riparian habitat has been a substantive consideration in the development of the AHCP, and this Plan was designed to minimize and mitigate management-related disturbances and create conditions that enable natural disturbances to create productive habitat.

GDRCo recognizes that the temporal and spatial configurations of future natural disturbances (and their specific related effects on the aquatic species covered under the Plan) are inherently unpredictable. The fact that certain types of natural disturbances will occur at some time during the term of the AHCP and at some location in the Plan Area is, however, reasonably foreseeable. The operating conservation program was designed, in large part, to be responsive to historical disturbance patterns. The prescriptions were intended to develop a landscape capable of delivering valuable functions in response to such natural disturbances. Therefore, the occurrence of most natural disturbances will not create conditions that should require the implementation of revised prescriptions.

Certain reasonably foreseeable disturbances, however, may be of such magnitude, occur with such frequency or impact particular portions of the Plan Area as to require the application of supplemental prescriptions for the protection of the Covered Species. These supplemental prescriptions are provided in AHCP Section 6.2.9.

There were five types of changes identified in the AHCP as potential “changed circumstances” as defined in applicable federal regulations and policies:

1. Fire covering more than 1,000 acres within the Plan Area or more than 500 acres within a single watershed within the Plan Area, but covering 10,000 acres or less;
2. Complete blow-down of more than 150 feet of previously standing timber within an RMZ, measured along the length of the stream; but less than 900 feet of trees within an RMZ, due to a windstorm;
3. Loss of 51% or more of the pre-harvest total tree basal area within any SSS, headwall swale, or Tier B Class III watercourses as a result of Sudden Oak Death (SOD) or stand treatment to control SOD;
4. Landslides that deliver more than 20,000 cubic yards and less than 100,000 cubic yards of sediment to a channel; and
5. Listing of a species that is not a Covered Species but is affected by the Covered Activities.

GDRCo did not discover nor was GDRCo made aware of any type of conditions that constitute Changed Circumstances as defined above during this reporting period.

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XII. Glossary

A. Abbreviations

ACC	Average Canopy Cover
AHCP	Aquatic Habitat Conservation Plan
AMRA	Adaptive Management Reserve Account
BACI	Before-After-Control-Impact
CalFire	California Department of Forestry and Fire Protection
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEG	Certified Engineering Geologist
CI	Confidence Interval
CMZ	Channel Migration Zone
DARR	Darroch Analysis with Rank Reduction
DEM	Digital Elevation Model
DBH	diameter at breast height
DOQQ	Digital Orthophoto Quarter Quads
DSC	Downstream Control
DSL	Deep-Seated Landslide
EC	Effective Shade
EEZ	Equipment Exclusion Zone
EMC	Effectiveness Monitoring Committee
ESA	Endangered Species Act
ESP	Enhancement of Survival Permit
FPRs	Forest Practice Rules
FRIS	Forest Resources Information System
FVS	Forest Vegetation Simulator
GDP	Gross Domestic Product
GDRCo	Green Diamond Resource Company
GHG	Green House Gases
GIS	Geographic Information System
HCP	Habitat Conservation Plan
HPA	Hydrographic Planning Area
HRA	Habitat Retention Area
HWS	Headwall Swale
IA	Implementation Agreement
IFM	Intensive Forest Management
ITP	Incidental Take Permit
LiDAR	Light Detection And Ranging
LSFLR	Lower South Fork Little River
LTO	Licensed Timber Operator
LWD	Large Woody Debris
MATO	Master Agreement for Timber Operations
MWA	Mass Wasting Assessment
MWPZ	Mass Wasting Prescription Zones

NAIP	National Agriculture Imagery Program
NCRWQCB	North Coast Regional Water Quality Control Board
NMFS	National Marine Fisheries Service
NSO	Northern Spotted Owl
PI	Prediction Interval
PIT	Passive Integrated Transponder
PG	Professional Geologist
RMA	Routine Maintenance Area
RMWDR	Road Management Waste Discharge Requirements
RMZ	Riparian Management Zone
RPF	Registered Professional Forester
RRC	Railroad Creek
RSMZ	Riparian Slope Stability Management Zone
RST	Rotary Screw Trap
RWU	Road Work Unit
SMZ	Slope Stability Management Zone
SOD	Sudden Oak Death
SRL	Shallow Rapid Landslide
SSC	Suspended Sediment Concentration
SSS	Steep Streamside Slope
SSSMU	Steep Streamside Slope Morphologic Unit
THP	Timber Harvesting Plan
TMIS	Timberlands Management Information Systems
TRT	Treatment
TTS	Turbidity Threshold Sampling
USC	Upstream Control
USFLR	Upper South Fork Little River
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WEST Inc.	Western EcoSystems Technology Inc.
WDRs	Waste Discharge Requirements
WSFPB	State of Washington’s Forest Practice Board
YOY	Young of the year
7DMAVG	highest 7-day moving mean of water temperature
7DMMX	highest 7-day moving mean of the maximum daily temperature

B. Definitions

Adaptive Management: As defined by the Services for purposes of their HCP program, a method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned (65 Federal Register 106, 36245).

Aerial logging: Movement of logs to a landing by use of helicopters, or balloons, often used where roads cannot be constructed to provide access to a harvesting unit.

Age class: One of the intervals into which the age range of trees is divided for classification or use in management.

Aggradation: Deposition in one place of material eroded from another. Aggradation raises the elevation of streambeds, floodplains, and the bottoms of other water bodies.

Alternative Geologic Prescription: Any prescription applied to a mass wasting prescription zone that deviates from the default prescriptions defined in GDRCo's AHCP.

Alternative Prescription: Excerpt from the 2013 Forest Practice Act; "(a) An alternative prescription shall be included in a THP when, in the judgment of the RPF, an alternative regeneration method or intermediate treatment offers a more effective or more feasible way of achieving the objectives of Section 913 [933, 953] than any of the standard silvicultural methods provided in this Article."

Approved Plan: All AHCP THPs with an approval date that falls within the reporting period. These THPs are queried and provide data for the THP summary tables in the AHCP Biennial Report.

Bankfull channel width: Channel width between the tops of the most pronounced bank on either side of a stream reach where water would just begin to flow out onto the floodplain.

Basal area: The cross sectional area of a single stem, including the bark, measured at breast height (4.5 feet above the ground).

Before-After-Control-Impact (BACI): An experimental approach that utilizes a paired design with treatment and control sites. Data are collected from both experimental sites before and after the treatment and an analysis is done to determine if the relationship of the response variable(s) between the treatment and control sites differs following the treatment.

Biomass harvesting: A hazard abatement process that involves the removal of logging debris that typically is piled during active harvesting operations. The debris is removed from the harvesting area and is used as hog fuel rather than being burned on site.

Break-in-slope: See Qualifying Slope Break.

Broadcast burn: A prescribed fire allowed to burn throughout a site preparation area to prepare it for regeneration. It does not include burning of organic matter which is piled during mechanical site preparation or for hazard reduction."

Buffer: A vegetation strip or management zone of varying size, shape, and character maintained along a stream, lake, road, or different vegetation zone to minimize the impacts of actions on sensitive resources.

Cable yarding (logging): Taking logs from the stump area to a landing using an overhead system of winch-driven cables to which logs are attached with chokers.

California Forest Practice Rules (CFPRs): Rules promulgated by the California Board of Forestry and administered by the California Department of Forestry and Fire Protection governing the conduct of commercial timber operations on state and private land in California.

Candidate Conservation Agreement with Assurances (CCAA): An agreement between a non-federal property owner and the Service(s), in which the property owner commits to implement conservation measures for a proposed or candidate species or a species likely to become a candidate or proposed in the near future. The property owner also receives assurances from the Service(s) that additional conservation measures will not be required and additional land, water, or resource use restrictions will not be imposed should the currently unlisted species become listed in the future (64 Federal Register 116, 32727). The agreement accompanying with an enhancement of survival permit issued under section 10(a)(1)(A) of the ESA.

Changed Circumstances: Changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the Services and that can be planned for (e.g. the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events.). 50 CFR §§ 17.3, 222.102. Changes that will constitute Changed Circumstances, and the responses to those circumstances, are described in Plan Section 6.2. Changed Circumstances are not Unforeseen Circumstances.

Channel: Natural or artificial waterway of perceptible extent that periodically or continuously contains moving water.

Channel Migration Zones (CMZs): Current boundaries of bankfull channel along the portion of the floodplain that is likely to become part of the active channel in the next 50 years. The area of the channel defined by a boundary that generally corresponds to the modern floodplain, but may also include terraces that are subject to significant bank erosion.

Class I watercourses: All current or historical fish-bearing watercourses and/or domestic water supplies that are on site and/or within 100 feet downstream of the intake.

Class II watercourses: As used in the Plan, watercourses containing no fish, but support or provides habitat for aquatic vertebrates. Seeps and springs that support or provide habitat for aquatic vertebrates are also considered Class II watercourses with respect to the conservation measures.

Class II-1 watercourse: A subset of Class II watercourses, as illustrated in Figure 6-2 of the AHCP.

Class II-2 watercourse: A subset of Class II watercourses, as illustrated in Figure 6-2 of the AHCP.

Class III watercourses: Small seasonal channels which do not support aquatic species, but have the potential to transport sediment to Class I or II watercourses.

Clearcutting: Even-aged regeneration method where all the merchantable trees in the stand are removed in one harvest. Regeneration is accomplished by natural or artificial means.

Cobble: Substrate particles 64-256 mm in diameter. Often subclassified as small (64-128 mm) and large (128-256 mm).

Colluvial hollow: A low tract of land surrounded by steep slopes and continually filled with colluvial material, may be "U" or "V" shaped, is a source for debris flow initiation, typically found above or near the head of a watercourse and generally does not flow water annually.

Commercial harvest: Removal of merchantable trees from a stand.

Commercial thinning: Any type of thinning producing merchantable material at least equal to the value of the direct costs of harvesting and to achieve optimum diameter growth and increase the eventual product value of the remaining trees.

Completed THPs: Completed THPs for the biennial report include AHCP THPs where all units have been depleted (i.e. the felling, logging, loading, & hauling have been completed) for all the units in the timber harvest plan during the reporting period. Note: Only the last unit to be depleted needs to fall within the reporting period.

Covered Activities: Certain activities carried out by Green Diamond in the Plan Area that may result in incidental take of Covered Species and all those activities necessary to carry out the commitments reflected in the Plan's Operating Conservation Program and IA.

Covered Species: The species identified in Table 1-4 of the AHCP, which the Plan addresses in a manner sufficient to meet all of the criteria for issuing an incidental take permit under ESA Section 10(a)(1)(B) and all of the criteria for issuing an enhancement of survival permit under ESA Section 10(a)(1)(A), as applicable.

Culvert: Buried pipe structure that allows streamflow or road drainage to pass under a road.

Debris slide: A landslide of mixed particle size, predominantly dry unconsolidated material. May move fast or slow.

Deep-seated landslide: Landslides that have a basal slip plane that is relatively deep and commonly extends into bedrock. These are typically vegetated with trees and/or grass and typically move incrementally.

Degradation (streambed): Erosional removal of materials from one place to another. Degradation lowers the elevation of streambeds and floodplains.

Diameter at breast height (DBH): The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.

Dissolved oxygen: Oxygen found in solution with water in streams and lakes. Solubility is generally measured in mg/l and varies with temperature, salinity, and atmospheric pressure.

Drainage: An area (basin) mostly bounded by ridges or other similar topographic features, encompassing part, most, or all of a watershed.

Drainage area: Total land area draining to any point in a stream, as measured on a map, aerial photo, or other horizontal, two-dimensional projection.

Effective date: The date(s) upon which the ITP and ESP are issued by the Services.

Enhancement of Survival Permit (ESP): A permit issued by the Service(s) pursuant to ESA Section 10(a)(1)(A) for any act that enhances the propagation or survival of a listed species that would otherwise be prohibited by ESA Section 9. The permit that authorizes incidental take of species covered by a CCAA.

Equipment Exclusion Zone (EEZ): An area where use of heavy equipment is not allowed.

Even-aged stand: A stand of trees composed of a single age class in which the range of tree ages is usually +/- 20 percent of rotation.

Even-aged harvest: The application of a combination of actions that results in the creation of even-aged stands. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Feasible: Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, operational, and technological factors, and considering what is allowable under the law.

Felling (timber): Physically cutting a tree from its stump including cutting of the felled tree into predetermined log lengths.

Fine sediment: Sediment with particle size of 2 mm and less, including sand, silt, and clay.

Floodplain: The area adjacent to the stream constructed by the river in the present climate and inundated during periods of high flow.

Forest management: The practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest.

Geomorphic features: Mass wasting features defined within the AHCP that include; deep-seated landslides (DSL), headwall swales (HWS), riparian slope stability management zones (RSMZ), slope stability management zones (SMZ), and shallow rapid landslides (SRL).

Gradient: Average change in vertical elevation per unit of horizontal distance.

Green Diamond's ownership: Commercial timberlands that Green Diamond owns in fee and lands owned by others subject to Green Diamond harvesting rights.

Ground-based yarding (logging): Movement of logs to a landing by use of tractors, either tracked or rubber tired (rubber tired skidders) or shovels (hydraulic boom log loaders).

Habitat: The place, natural or otherwise, (including climate, food, cover, and water) where an animal, plant, or population naturally or normally lives and develops.

Habitat Conservation Plan (HCP). As defined in the Services' HCP Handbook, a planning document that is a mandatory component of an application for an incidental take permit under ESA Section 10(a)(1)(B); also known as a conservation plan. The document that, among other things, identifies the operating conservation program that will be implemented to minimize, mitigate, and monitor the effects of incidental take on the species covered by a Section 10(a)(1)(B) permit.

Harvesting: All activities necessary to cut, remove, and transport timber products from the Plan Area.

Harvesting Rights: The rights to conduct timber operations on lands owned in fee by another. Short-term harvesting rights generally expire upon the conclusion of timber operations, upon a date certain, or a combination of the two. Perpetual harvesting rights pertain to existing and subsequent crops of timber and continue without expiration.

Hazard Abatement: The process in which the woody debris that remains after harvesting a stand of timber is removed in order to reduce fire hazard.

Headwall swales: Areas of narrow, steep, convergent topography (swales or hollows) located at the heads of Class III watercourses that have been sculpted over geologic time by repeated debris slide and debris flow events.

HPA Group: HPAs that have been grouped together based on their geologic and geomorphic characteristics for purposes applying slope stability measures.

Hydrographic Planning Area (HPA): The hydrographic areas and hydrologic units mapped in the AHCP/CCAA which encompass the Eligible Plan Area and surrounding lands in common watersheds.

Hydrological disconnection: Isolation of the road network such that drainage will not directly enter into watercourses.

Implementation Agreement (IA): An agreement between the Service(s) and the incidental take permittee(s) that identifies the obligations of the parties, identifies remedies if parties fail to meet their obligations, provides assurances to the Service(s) that the conservation plan will be implemented, and provides assurances to the permittee(s) that implementation of the plan satisfies ESA requirements for the species and activities covered by the plan and permit.

Incidental take: The taking of a federally listed species, if such taking is incidental to, and not the purpose of, carrying out otherwise lawful activities.

Incidental Take Permit (ITP): A permit issued by the Services pursuant to ESA Section 10(a)(1)(B) authorizing incidental take of federally listed species named on the permit.

Initial Plan Area: Green Diamond's ownership within the 11 HPAs as of the effective date of the Permits, as depicted in Figure 1-1 of the AHCP.

Inner Gorge: A geomorphic feature formed by coalescing scars originating by coalescing scars originating from landsliding and erosional processes caused by historically active stream erosion. The feature is identified as that area beginning immediately adjacent to the stream channel below extending up slope to the first break in the slope. Inner gorge is a subset of Steep Streamside Slopes.

Landings: The areas where harvested trees are gathered (through skidding or yarding) for subsequent transport out of the forest.

Large woody debris (LWD): Larger pieces of wood in stream channels or on the ground, including logs, root wads, and large chunks of wood that provide important biological and physical functions.

Mainline roads: Roads that support significant amounts of traffic annually from major tracts of timber or provide the main access into a tract for non-harvest management activities.

Mainstem: Principal stem of channel of a drainage system.

Management roads: Roads that are needed to either support long term management activities in the Plan Area or provide access to timber that will be harvested within the next 20 years.

Manning's roughness coefficient: A variable that represents the resistance of the bed of a stream channel to the flow of water in it.

Mass soil movement (mass wasting): All geologic processes in which masses of earth materials move downslope by gravitational forces. Includes, but is not limited to, landslides, rock falls, and debris avalanches. It does not, however, include surface erosion by running water. It may be caused by natural erosional processes, or by natural disturbances (e.g., earthquakes or fire events) or human disturbances (e.g., mining or road construction).

Mass Wasting Prescription Zones (MWPZs): Steep streamside slopes, deep-seated landslides, and headwall swales where slope stability measures will be applied.

Merchantable: Trees or stands having the size, quality, and condition suitable for marketing under a give economic condition, even if not immediately accessible for logging.

National Marine Fisheries Service (NMFS): A division of the U.S. Department of Commerce that is responsible for the stewardship of the nation's marine resources, the protection and recovery of listed marine species, and the authorization of incidental take of listed marine species.

Operating Conservation Program: As defined in 50 CFR §§ 17.3, 222.102, those conservation management activities which are expressly agreed upon and described in a conservation plan or its implementing agreement, if any, and which are to be undertaken for the affected species when implementing an approved conservation plan, including measures to respond to changed circumstances. In this Plan and the IA, the conservation management activities and specific measures (including provisions for changed circumstances, funding, monitoring, reporting, adaptive management, and dispute resolution) as set forth in Section 6.2.

Orthorectified: The process where the effects of image perspective (tilt) and relief (terrain) effects have been removed for the purpose of creating a planimetrically correct image with a constant scale.

Outmigrant: A juvenile salmonid fish that is moving downstream toward the ocean during which a physiological adaptation termed smoltification occurs thus allowing the young fish to survive in a saline environment.

Overstory: That portion of the trees, in a forest of more than one story, forming the upper or uppermost canopy layer.

Parr: Young salmonid, in the stage between alevin and smolt, that has developed distinctive dark "parr marks" on its sides and is actively feeding in fresh water.

Permanent road decommissioning: Decommissioning of a road that will not be needed for future management activities.

Permit or Permits: The incidental take permit (ITP) issued by NMFS to Green Diamond pursuant to ESA Section 10(a)(1)(B) or the enhancement of survival permit (ESP) issued by USFWS to Green Diamond pursuant to ESA Section 10(a)(1)(A) ("ESP"), or both the ITP and the ESP.

Permeability: The rate of water flow through streambed substrate (e.g., gravels).

Physiographic provinces: Geographical areas that are delineated according to common physical characteristics relating to their geology, and geomorphology.

Plan: The Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances prepared by Green Diamond, dated October 2006.

Plan Area: All commercial timberland acreage within eleven Hydrographic Planning Areas (HPAs) on the west slopes of the Klamath Mountains and the Coast Range of California where Green Diamond owns fee lands and Harvesting Rights (Green Diamond's ownership), during the period of such ownership within the term of the Permits, subject to the limitations described in AHCP Section 1.3.2.3 and in the IA, and up to 100 miles of roads on lands where Green Diamond owns and exercises Road Access Rights within its approved Timber Harvesting Plan (THP) areas in the Eligible Plan Area during the term of the Plan and Permits. This is the geographic area where incidental take will be authorized, the Covered Activities will occur, and the Operating Conservation Program will be implemented. Except where stated otherwise in the Plan, references to lands, commercial timberlands, and Green Diamond's ownership in the context of the Plan Area include lands owned in fee and lands subject to harvesting rights.

Pond: A body of water smaller than a lake, sometimes artificially formed.

Pools: Pools are impoundments of flowing water in streams which are formed by structures such as bedrock, boulders, or woody debris in or adjacent to the stream channel. Velocity conditions within pools generally result in the deposition of finer sediment types.

Population: A collection of individuals that share a common gene pool.

Prescribed burning: Introduction of fire under controlled conditions to remove unwanted brush, logging slash, and/or woody debris or specified forest elements.

Professional Geologist (PG): A person who holds a valid California license as a professional geologist pursuant to California's Department of Consumer Affairs Geologist and Geophysicist Act.

Qualifying slope break: A decline in slope gradient (below the specified minimum slope gradient for the given HPA) and of sufficient distance that it may be reasonably expected to impede sediment delivery to watercourses from shallow landslides originating above the slope break.

Red light threshold: A threshold triggered by multiple negative monitoring responses (a series of yellow light triggers) indicating a more serious condition than the yellow light threshold.

Regeneration: The renewal of tree cover by natural or artificial means. Also the young tree crop (seedlings and saplings).

Registered Professional Forester (RPF): A person who holds a valid license as a professional forester pursuant to Article 3, Section 2, Division 1 of the California Public Resources Code (as in effect on the date of issuance of the Permits).

Riffle: A stream segment characterized by swiftly flowing water with surface agitation and have bars of deposited sediments. Riffles typically occur in areas of increased channel gradient where hydraulic conditions sort transported sediments (gravel, cobble, and boulders).

Riparian: That portion of the watershed or shoreline influenced by surface or subsurface waters, including stream or lake margins, marshes, drainage courses, springs, and seeps. Riparian areas usually have visible vegetative or physical characteristics reflecting the influence of water. Riversides and lake borders are typical riparian areas.

Riparian Management Zone (RMZ): A riparian buffer zone on each side of Class I or Class II watercourses that receive special treatment to provide temperature control, nutrient inputs, channel stability, sediment control, and LWD recruitment.

Riparian Slope Stability Management Zone (RSMZ): A RMZ below an SMZ or where streamside slopes exceed the minimum Steep Streamside Slope gradients. This is the SSS inner zone.

Salmonids: The taxonomic group of fishes belonging to the family Salmonidae including salmon, trout, char and graylings.

Secondary roads: Roads that support periodic traffic into portions of tracts with the level of use dependent upon location of harvest units.

Sediment: Fragments of rock, soil, and organic material transported and deposited by wind, water, or other natural phenomena.

Sedimentation: Deposition of material suspended in water or air, usually when the velocity of the transporting medium drops below the level at which the material can be supported.

Seep: An area of minor ground water outflow onto the land surface or into a stream channel; flows that are too small to be a spring.

Selection harvest: The removal or trees, individually or in small groups, from the forest.

Services: NMFS and USFWS.

Shallow-rapid landslide (SRL): Rapid landslide event that is confined to the overlying mantle of colluvium and weathered bedrock (in some instances competent bedrock) that commonly leave a bare unvegetated scar after failure. These landslides may include debris slides, debris flows, channel bank failures, and rock falls.

Silviculture: The specific methods by which a forest stand or area is harvested and regenerated over time to achieve the desired management objectives.

Size class: The categorization of trees into one of the following four DBH classes: seedling (< 1"), sapling (1" to 4.9"), pole (5" to 11.9"), sawtimber (12" and larger),

Skid trail: An access cut through the woods for skidding logs with ground-based equipment. It is not a high enough standard for use by highway vehicles, such as a log truck, and is therefore not a road.

Slash: Woody residue left on the ground after trees are felled, or accumulated there as a result of a storm, fire, or silvicultural treatment.

Slope break: See Qualifying Slope Break.

Slope Stability Management Zone (SMZ): The outer zone of an SSS zone.

Smolt: Juvenile salmonid that is undergoing physiological changes to cope with a marine environment.

Species: As defined in ESA Section 3(15), "the term 'species' included any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." Also, a population of individuals that are more or less alike and that are able to breed and produce fertile offspring under natural conditions.

Spring: An area of ground water outflow onto the land surface or into a stream channel; flows are greater than a seep.

Stand: A group of trees that possesses sufficient uniformity in composition, structure, age, spatial arrangement, or condition to distinguish it from adjacent groups.

Steep Streamside Slopes (SSS): Steep slopes located immediately adjacent to a stream channel; defined by: 1) a minimum slope gradient leading to a Class I or Class II watercourse, 2) a maximum distance from a Class I or Class II watercourse, and 3) a reasonable ability for slope failures to deliver sediment to a watercourse.

SSS zone: The area in which default prescriptions for SSS will be applied; consists of an inner zone (the RSMZ) and outer zone (the SMZ).

Stream: A natural watercourse with a well-defined channel with distinguishable bed and bank showing evidence of having contained flowing water indicated by deposit of rock, sand, gravel, or soil.

Substrate: Mineral or organic material that forms the bed of a stream.

Summer period: The period from May 15th through October 15th.

Submitted THPs: Total number of AHCP THPs that have been received by CalFire and new letters of notification have been sent to the services during the reporting period. No summary data for these THPs.

Surface erosion: Movement of soil particles down or across a slope, as a result of gravity and a moving medium such as rain or wind. The transport of sediment depends on the steepness of the slope, the texture and cohesion of the soil particles, the activity of rainsplash, sheetwash, gullying, and dry ravel processes, and the presence of vegetation.

Suspended sediment: Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension. That part of a stream's total sediment load carried in the water column.

Sustained yield: The yield of commercial wood that an area can produce continuously at a given intensity of management consistent with required environmental protection and which is professionally planned to achieve over time a balance between growth and removal.

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 USCA § 1532(19); 50 CFR § 222.102. "Harm" means an act that actually kills or injures fish or wildlife, which act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including for USFWS species breeding, feeding or sheltering and for NMFS species breeding, spawning, rearing, migrating, feeding or sheltering. 50 CFR §§ 17.3, 222.102.

Tannic water: Water having a high level of dissolved organic compounds from leaf material which give it a dark brown color and reduce water clarity.

Temporary road construction: A road that is built and used only during a timber operation. These roads have a surface adequate for seasonal logging use and have drainage structures, if any, adequate to carry the anticipated flow of water during the period of use. Upon completion of use, all drainage structures are removed.

Temporary road decommissioning: Decommissioning a road that may be used again in the future for management activities but typically not for at least 20 years.

Thalweg: The deepest point of a stream along any channel cross section.

Thinning: A treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality.

Timber harvesting: All activities necessary to cut, remove, and transport timber products from an area.

Timber Harvesting Plan (THP): A plan describing a proposed timber harvesting operation pursuant to 14 CCR section 4582 (as in effect on the date of issuance of the Permits).

Turbidity: An indicator of the amount of sediment that is suspended in water. It has been used as an expression of the optical properties of a water sample that causes light rays to be scattered and absorbed, rather than transmitted through the sample.

Watercourse: Any well-defined channel with distinguishable bed and bank showing evidence of having contained flowing water indicated by deposit of rock, sand, gravel, or soil. Watercourse also includes manmade watercourses.

Watercourse transition line: That line closest to the watercourse where perennial vegetation is permanently established.

Water drafting: Direct removal of water from a watercourse or pond into a water truck or for storage in reservoirs or tanks for use in dust abatement or fire suppression.

Watershed: The catchment area of land draining into a river, river system, or body of water; the drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

Winter period: The period from October 16th through May 14th.

Yarding: (Alternatively: skidding). The movement of forest products from the stump to the landing.

Young of the year (YOY): A juvenile fish that is less than one year old.

Yellow light threshold: An early warning indicator identifying and rapidly addressing a potential problem. This threshold typically can be exceeded by a single negative monitoring result.

XIII. Appendices

A. Post-Harvest Forms of Completed THPs

B. Summary Table of Road Treatment Implementation and Effectiveness Monitoring Results from 2021 and 2022

C. 2022 Summer Juvenile Salmonid Population Sampling Program annual report to NMFS

D. 2022 Juvenile Salmonid Outmigrant Trapping Program – Little River annual report to NMFS

Appendix A

Post-Harvest Forms of Completed THPs

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 091501 **GDRCO No:** 091501

RPF: Mohrmann, Z. **CDF No:** 1-15-068H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	223404	29.31	20.53	8.77				
B	222612	20.89	18.07	2.82				
C	222617	27.54	18.84	8.69				
D	223602	34.20	14.22	18.71	1.27			
E	223510	45.77	26.06	15.10	4.61			
F	120101	32.84	28.38	4.47				
G	223609	29.71	22.49	7.22				
H	223608	17.50	15.03	2.47				
I	223611	30.03	20.95	8.18	0.90			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A Modified	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	DSL	II-1	-
D	RSMZ(SSS)	II-2	1.31
D	RSMZ(SSS)	II-2	0.78
D	SRL	II-1	2.55

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Geology

Unit	Feature	Watercourse	Acres of Retent.	Retent. Req. Met?
D	SRL	II-2	0.22	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
D	SRL	II-2	0.10	Yes
E	DSL	1F	-	Yes
E	DSL	1F	7.09	Yes
E	RSMZ(SSS)	1F	0.57	Yes
E	RSMZ(SSS)	II-1	1.05	Yes
E	RSMZ(SSS)	II-2	0.49	Yes
E	SRL	1F	1.77	Yes
E	SRL	1F	3.17	Yes
E	SRL	1F	1.00	Yes
E	SRL	1F	0.54	Yes
E	SRL	II-2	1.91	Yes
F	RSMZ(SSS)	II-2	2.04	Yes
I	DSL	3A	1.53	Yes
I	DSL	3A	1.46	Yes
I	DSL	II-2	3.21	Yes
I	SRL	3A	0.90	Yes
I	SRL	II-2	0.53	Yes
I	SRL	II-2	1.45	Yes

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed	091501	**GDRCO No:**	091501
THP Name:			
RPF:	Mohrmann, Z.	**CDF No:**	1-15-068H

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
F	SRL	Alt Geology	II-2	0.01		Yes
	Reason Not Met?	N/A				
	Description	No harvest on or within the buffer of Shallow Rapid Landslide LS-5				
F	SRL	Alt Geology	II-2	0.01		Yes
	Reason Not Met?	N/A				
	Description	No harvest on or within the buffer of Shallow Rapid Landslide LS-5.				
F	SRL	Alt Geology	II-2	0.05		Yes
	Reason Not Met?	N/A				
	Description	No harvest on or within the buffer of Shallow Rapid Landslide LS-5.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 092001 **GDRCO No:** 092001

RPF: Mohrmann, Z. **CDF No:** 1-21-00011-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	222618	6.60	4.90	1.70				
B	222510	28.06	16.31	11.75				
C	222511	32.25	24.83	5.86	0.33			
D	223511	14.34	1.09		6.04			
E	223610	25.81	22.20	3.61				
F	223621	24.97	21.97	1.94				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 092001 **GDRCO No:** 092001

RPF: Mohrmann, Z. **CDF No:** 1-21-00011-Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-2	0.99
B	RSMZ(SSS)	II-2	1.85
B	RSMZ(SSS)	II-2	2.79
C	DSL	II-2	1.06
C	RSMZ(SSS)	II-2	4.04
C	RSMZ(SSS)	II-2	0.70
C	SMZ(SSS)	II-2	0.15
C	SRL	II-2	0.29
D	DSL	1R	5.88
E	RSMZ(SSS)	II-1	0.66
F	RSMZ(SSS)	II-1	0.25
F	RSMZ(SSS)	II-1	0.24

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
D	DSL	Alt Geology	1R	6.89		Yes
	Reason Not Met?	N/A				
	Description	Selection harvesting on a historically active deep-seated landslide				
F	SRL	Alt Geology	II-1	1.00		Yes
	Reason Not Met?	N/A				
	Description	SRL reviewed in the field by J. Woodward (PG) and his technician (A. Fehrenbach). Low slopes.				

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 151601

GDRCO No: 151601

RPF: Drakeford, J.

CDF No: 1-16-093H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	512112	27.74		27.74				
B	512113	23.67		7.81				
C	512216	15.92	9.16	6.76				
D	511517	45.07	27.01	17.24	0.83			
E	511515	15.18	9.68	5.51				
F	512303	38.63	26.38	12.26				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 151601 **GDRCO No:** 151601

RPF: Drakeford, J. **CDF No:** 1-16-093H

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	1F	1.06
B	RSMZ(SSS)	1F	2.15
C	RSMZ(SSS)	II-2	1.30
D	HWS	3B	0.32
D	HWS	II-1	0.30
D	HWS	II-1	0.55
D	RSMZ(SSS)	1F	1.13
D	RSMZ(SSS)	II-2	2.09
D	RSMZ(SSS)	II-2	0.12
D	SRL	II-1	0.50
D	SRL	II-1	-
D	SRL	MOD3A	0.09
F	RSMZ(SSS)	II-2	2.10

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
E		Use of landings within an RMZ				Yes
	Reason Not Met?	N/A				
	Description	Description and Explanation. The proposed in lieu practice involves the use of an existing landing partially located in a RMZ to facilitate cable yarding operations. The landing consists of a short seasonal road spur that terminates to a favorable setting for a small yarder or yoder. The entire spur and approximatel 50 percent of the landing area is within theRMZ. The road and landing are well established although quite narrow and constricted. No blading, widening or brushing within the WLPZ portion of the landing area is necessary for use. No fill is necessary for landing use. A small spur is proposed for construction to be used as a turn around for log trucks or as an additional decking area. This spur will be constructed outside of the RMZ. The proposed practice is different from the standard practice in that the standard practice would be to avoid equipment operations in a RMZ.				

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 171802 **GDRCO No:** 171802

RPF: Mohrmann, Z. **CDF No:** 1-18-00176-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	431512	22.25	18.22	4.03				
B	431505	40.39	23.33	11.69	5.46			
C	432203	24.20	13.71	10.48				
D	432303	38.81	27.62	10.03				
E	432308	32.14	26.49	5.64				
F	432605	38.67	19.27	19.03	0.37			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Ponds	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-2	0.35
E	RSMZ(SSS)	II-2	0.09
F	RSMZ(SSS)	II-2	1.98
F	SRL	II-2	0.16
F	SRL	II-2	0.17

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	171802	**GDRCO No:**	171802
RPF:	Mohrmann, Z.	**CDF No:**	1-18-00176-HUM

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 191902 **GDRCO No:** 191902

RPF: East, R. **CDF No:** 1-20-00074 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	503604	42.48	24.29	10.29	7.90			
B	503607	28.10	22.00	5.73	0.38			
C	400113	40.80	28.11	10.88	1.80			
D	400104	33.96	30.56	3.40				
E	400110	29.05	25.61	3.43				
F	400112	26.95	24.03	2.93				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	DSL	II-1	3.78
B	DSL	II-1	5.91
E	SRL	II-1	0.10

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	191902	**GDRCO No:**	191902
RPF:	East, R.	**CDF No:**	1-20-00074 Hum

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 192101 **GDRCO No:** 192101

RPF: Mohrmann, Z. **CDF No:** 1-21-00067-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	410504	36.65	31.39	5.27				
B	410501	32.55	24.15	8.40				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A Modified	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-1	0.64
A	RSMZ(SSS)	II-1	0.69
A	RSMZ(SSS)	II-2	1.73
A	SRL	II-1	0.42
B	RSMZ(SSS)	II-2	3.75

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	192101	**GDRCO No:**	192101
RPF:	Mohrmann, Z.	**CDF No:**	1-21-00067-Hum

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 261801 **GDRCO No:** 261801

RPF: Mohrmann, Z. **CDF No:** 1-18-00109 HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	622506	32.29	28.76	3.41	0.12			
B	622505	25.70	22.55	3.15				
C	633016	32.24	22.52	8.37	1.35			
D	631826	17.79	15.88	1.90				
E	631824	25.79	21.02	4.77				

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	DSL	3A	0.07
C	RSMZ(SSS)	II-1	0.60
C	RSMZ(SSS)	II-1	3.00

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	261801	**GDRCO No:**	261801
RPF:	Mohrmann, Z.	**CDF No:**	1-18-00109 HUM

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 262001 **GDRCO No:** 262001

RPF: East, R. **CDF No:** 1-20-00107-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	733213	30.24	21.14	9.10				
B	630410	17.69	14.39	3.33				
C	630810	24.56	21.61		2.91			

Riparian

Feature	Requirements Met?
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 272001 **GDRCO No:** 272001

RPF: Smith, S. **CDF No:** 1-21-00046-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	632122	32.51	29.25	0.60	2.65			
B	632108	34.01	30.65	2.42	0.93			
C	632216	30.56	23.31	7.25				
D	632203	34.24	31.51	0.48	2.25			
E	632116	34.58	30.37		4.21			
F	632207	35.36	31.49	1.28	2.58			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 381901 **GDRCO No:** 381901

RPF: Crocker, K. **CDF No:** 1-20-00105-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	723227	13.78	12.33	0.28	1.17			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 421601 **GDRCO No:** 421601

RPF: Camper, L. **CDF No:** 1-16-099H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	721020	25.08	21.79	3.29				
B	721109	32.57	30.12		2.45			
C	721111	30.39	25.48	1.98	2.92			
D	721412	31.00	28.05		2.95			
E	721426	33.04	27.78	1.98	3.29			
F	722429	35.25	28.61		6.64			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	SRL	II-2	-

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 421601

GDRCO No: 421601

RPF: Camper, L.

CDF No: 1-16-099H

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
E	SRL	Alt Geology	II-2	0.10		Yes
Reason Not Met?		N/A				
Description		Unit E: Forgo the default buffer on the head of the shallow rapid landslide.				

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 422001 **GDRCO No:** 422001

RPF: Mohrmann, Z. **CDF No:** 1-20-00067 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	721027	30.87	26.98	3.89				
B	721535	28.52	24.94	3.58				
C	721530	60.05	30.91	25.75	2.80			
D	721508	29.88	22.52	0.43	6.94			
E	721622	43.97	32.03	9.34	0.82			
F	722121	32.59	23.01	9.66				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 422001 **GDRCO No:** 422001

RPF: Mohrmann, Z. **CDF No:** 1-20-00067 Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	RSMZ(SSS)	1F	0.50
C	RSMZ(SSS)	1F	0.43
C	RSMZ(SSS)	II-1	0.46
C	RSMZ(SSS)	II-2	0.73
C	RSMZ(SSS)	II-2	3.45
C	RSMZ(SSS)	II-2	0.23
C	RSMZ(SSS)	II-2	0.23
D	DSL	3B	6.40
F	RSMZ(SSS)	II-1	1.03
F	RSMZ(SSS)	II-1	3.31
F	RSMZ(SSS)	II-1	0.47
F	RSMZ(SSS)	II-2	0.79

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 431801

GDRCO No: 431801

RPF: Kegerreis,J

CDF No: 1-18-00145-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	812816	27.36						
B	813315	27.53			5.67			
C	813310	23.05	14.80	8.25				
D	813312	36.91	24.61	12.30				
E	813421	23.05			2.61			
F	710417	40.01			7.41			
G	710412	35.83	26.93	8.90				
H	710409	6.25	5.83	0.34				
I	710418	33.84			2.04			
J	710903	29.22	22.56	6.59	0.06			
K	710904	47.97	21.08	21.98	4.91			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Ponds	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 431801 **GDRCO No:** 431801

RPF: Kegerreis,J **CDF No:** 1-18-00145-HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
F	DSL	II-2	0.80
K	DSL	II-1	1.90
K	RSMZ(SSS)	1F	2.03
K	RSMZ(SSS)	II-2	1.28
K	SRL	1F	0.53

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 451501

GDRCO No: 451501

RPF: Smith, S.

CDF No: 1-15-051H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	811403	43.80	23.45	18.07	2.28			
B	811428	14.77	9.18	5.59				
C	811313	30.67	22.48	3.21	4.97			
D	811319	30.18	27.32	0.60	2.26			
E	821807	31.12	13.76	17.36				
F	821805	24.86	17.41	7.46				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 451501 **GDRCO No:** 451501

RPF: Smith, S. **CDF No:** 1-15-051H

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-2	0.44
B	RSMZ(SSS)	II-1	0.99
B	RSMZ(SSS)	II-2	1.20
C	RSMZ(SSS)	II-2	2.14
E	RSMZ(SSS)	II-2	0.49
E	RSMZ(SSS)	II-2	2.94
E	RSMZ(SSS)	II-2	0.80
F	RSMZ(SSS)	1F	0.31
F	RSMZ(SSS)	II-1	0.98
F	RSMZ(SSS)	II-2	0.16
F	RSMZ(SSS)	II-2	2.85

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
A	RSMZ(SSS)	Alt Geology	1F	1.79		Yes
	Reason Not Met?	N/A				
	Description	No harvesting within the RSMZ.				
A	RSMZ(SSS)	Alt Geology	II-2	0.49		Yes
	Reason Not Met?	N/A				
	Description	No harvesting within the RSMZ.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 451801

GDRCO No: 451801

RPF: Camper, L.

CDF No: 1-18-00175HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	812402	25.76	20.31	5.45				
B	811325	18.38	16.16	0.51	1.71			
C	811320	28.72	25.06	2.50	1.16			
D	820714	16.43	13.32		3.11			
E	821732	34.83	28.69	5.80	0.34			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
Class III Tier A Modified	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 451801 **GDRCO No:** 451801

RPF: Camper, L. **CDF No:** 1-18-00175HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-2	3.67
D	DSL	3A	2.55
E	RSMZ(SSS)	II-1	0.78
E	RSMZ(SSS)	II-1	0.49
E	SMZ(SSS)	II-1	0.34
E	SRL	3B	0.09
E	SRL	II-1	0.24
E	SRL	II-1	0.34

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
E	DSL	Alt Geology	3B	0.67		Yes
	Reason Not Met?	N/A				
	Description	UA1: Selection harvest on the body of the deep-seated landslide in Unit E.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 451901 **GDRCO No:** 451901

RPF: Smith, S. **CDF No:** 1-20-00099-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	821001	31.38	27.03	2.16	2.19			
B	820300	35.82	31.77	3.00	1.05			
C	820510	36.07	33.14	1.61	1.33			
D	821007	38.47	31.70	6.26	0.51			
E	821005	34.59	31.43	2.46	0.70			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	SRL	II-1	0.73
D	SRL	II-1	0.49
E	SRL	II-1	0.16

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471701 **GDRCO No:** 471701

RPF: Camper, L. **CDF No:** 1-17-064H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	913414	31.54	20.80	10.74				
B	913403	32.04	18.13	13.92				
C	913314	30.12	26.13	3.99				
D	810321	30.88	27.29	3.58				
E	811122	20.81	17.63	3.18				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	1F	0.38
B	RSMZ(SSS)	1F	1.83
B	RSMZ(SSS)	1F	2.88
E	RSMZ(SSS)	II-1	1.45
E	SMZ(SSS)	II-1	0.41

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	471701	**GDRCO No:**	471701
RPF:	Camper, L.	**CDF No:**	1-17-064H

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
A		Class III skid crossing				Yes
Reason Not Met?		N/A				
Description		At Road Point 1 this THP proposes a shovel crossing on a Class 3 watercourse.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471702 **GDRCO No:** 471702

RPF: East, R. **CDF No:** 1-17-060H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	912004	28.00	18.44		9.56			
B	912006	40.84	29.85	10.99				
C	912106	30.58	27.50	2.49	0.59			
D	912214	34.50	30.82	1.69	2.00			
E	912508	28.27	20.05	8.21				
F	913623	37.65	27.60	0.54	9.51			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471702 **GDRCO No:** 471702

RPF: East, R. **CDF No:** 1-17-060H

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	DSL	1F	0.76
A	DSL	1F	0.75
A	DSL	1F	0.26
A	DSL	II-1	1.51
A	RSMZ(SSS)	1F	0.96
A	SRL	II-1	0.10
B	RSMZ(SSS)	1F	0.79
B	RSMZ(SSS)	1F	0.57
E	RSMZ(SSS)	II-2	1.01
E	RSMZ(SSS)	II-2	3.50
F	RSMZ(SSS)	II-1	0.62
F	RSMZ(SSS)	II-2	5.45
F	RSMZ(SSS)	II-2	1.23
F	SRL	II-1	0.10

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
A	SRL	Alt Geology	II-2	0.10		Yes
	Reason Not Met?	N/A				
	Description	The southern Shallow Rapid landslide is associated with road point 1 and consists of a fill failure that initiated on the eastern existing seasonal road spur leading into the middle of unit A and deposited onto the BL 2100.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471707

GDRCO No: 471707

RPF: Camper, L.

CDF No: 1-18-069

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	810723	39.06	26.03	13.03				
B	810611	27.11	22.71	4.40				
C	810608	24.74	16.60	8.14				
D	810507	62.26	21.83	29.91	10.53			
E	810426	26.42	21.29	5.12				
F	810320	30.43	27.59	1.87	0.98			
G	811706	16.38	11.18	5.19				
H	913224	4.74	2.62	2.12				
I	913223	30.65	9.33	19.12	2.20			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471707 **GDRCO No:** 471707

RPF: Camper, L. **CDF No:** 1-18-069

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-1	0.26
B	RSMZ(SSS)	II-2	0.96
C	SRL	II-1	0.27
C	SRL	II-2	0.26
D	CMZ	1F	0.69
D	DSL	1F	6.27
D	DSL	1F	0.61
D	SRL	1F	0.49
D	SRL	1F	0.10
D	SRL	1F	0.10
D	SRL	1F	0.92
D	SRL	1F	1.54
D	SRL	II-1	0.13
I	SRL	1F	2.31
I	SRL	1F	0.66
I	SRL	1F	0.95

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471707 **GDRCO No:** 471707

RPF: Camper, L. **CDF No:** 1-18-069

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
D	SRL	Alt Geology	II-2	1.22		Yes
	Reason Not Met?	N/A				
	Description	Custom Exception?				
D	SRL	Alt Geology	II-2	1.64		Yes
	Reason Not Met?	N/A				
	Description	Custom Exception?				
I	SRL	Alt Geology	1F	3.07		Yes
	Reason Not Met?	N/A				
	Description	Custom Exception?				

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471802 **GDRCO No:** 471802

RPF: MahonyMoyer, Evan **CDF No:** 1-18-00140 HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1012816	37.59	23.50	3.78	3.23			
B	1013315	23.38	18.95	4.43				
C	1013327	40.32	32.23	3.00	5.11			
D	1013304	16.00	13.71	1.63	0.67			
E	910410	30.46	26.77	0.87	2.82			
F	910407	28.27	23.59		4.68			

Riparian

Feature	Requirements Met?
Class I	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	RSMZ(SSS)	II-2	1.10
C	RSMZ(SSS)	II-2	0.53

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	471802	**GDRCO No:**	471802
RPF:	MahonyMoyer, Evan	**CDF No:**	1-18-00140 HUM

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471903 **GDRCO No:** 471903

RPF: MahonyMoyer, Evan **CDF No:** 1-19-00208HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	911606	54.00	22.87	30.04	1.09			
B	911505	36.16	22.93	13.23				
C	912131	18.81	16.51		2.30			
D	912821	25.49	21.38	4.11				
E	912722	24.94	21.58	1.86	1.50			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	DSL	II-1	3.57
A	DSL	II-1	8.54
A	SRL	II-1	0.27

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	471903	**GDRCO No:**	471903
RPF:	MahonyMoyer, Evan	**CDF No:**	1-19-00208HUM

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471904 **GDRCO No:** 471904

RPF: Mohrmann, Z. **CDF No:** 1-19-00209HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	913513	39.62	29.13	10.49				
B	913413	39.38	29.58	9.80				
C	913521	23.92	15.86	8.06				
D	810314	32.73	16.47	15.61	0.65			
E	811019	22.77	9.04	13.36	0.37			
F	810222	27.38	15.86	11.52				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471905 **GDRCO No:** 471905

RPF: Kirk,Christopher **CDF No:** 1-20-00046 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	812905	46.67	18.63	28.03				

Riparian

Feature	Requirements Met?
Class I	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	1F	3.86

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 471906 **GDRCO No:** 471906

RPF: Kegerreis,J **CDF No:** 1-20-00075 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	912001	30.44	25.84	4.60				
B	912125	28.14	14.74	13.40				
C	912919	37.04	20.65	15.85	0.54			
D	912915	41.33	31.14	10.19				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-1	0.43
C	SRL	1F	0.39
C	SRL	II-1	0.04
C	SRL	II-1	0.15
C	SRL	MOD3A	0.30

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	471906	**GDRCO No:**	471906
RPF:	Kegerreis,J	**CDF No:**	1-20-00075 Hum

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 472001 **GDRCO No:** 472001

RPF: Mohrmann, Z. **CDF No:** 1-20-00088 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	910808	21.71	19.38		2.33			
B	910913	36.53	26.60	9.93				

Riparian

Feature	Requirements Met?
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Ponds	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-1	0.54
B	SRL	II-2	0.06

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 472003

GDRCO No: 472003

RPF: Kegerreis,J

CDF No: 1-20-00133-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	810403	22.06	12.08	9.99				
B	810322	8.05	7.09		0.97			
C	810820	20.13	15.84	4.28				
D	810908	25.38	12.13	13.24				
E	810823	21.45	7.90	12.32	1.23			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 472003 **GDRCO No:** 472003

RPF: Kegerreis,J **CDF No:** 1-20-00133-Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-1	0.20
A	RSMZ(SSS)	II-1	0.68
A	RSMZ(SSS)	II-2	0.76
A	SMZ(SSS)	II-1	0.03
C	RSMZ(SSS)	II-1	1.44
C	RSMZ(SSS)	II-1	1.58
D	RSMZ(SSS)	1F	1.72
E	DSL	1F	0.68

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 472004 **GDRCO No:** 472004

RPF: Kegerreis,J **CDF No:** 1-21-00099-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	910915	38.54	19.63	17.14	1.77			
B	910815	27.53	18.80	8.73				
C	911714	39.99	29.04	10.81	0.15			
D	911720	34.06	24.82	9.24				
E	912117	28.68	24.32	4.36				
F	912020	26.38	22.05	3.88	0.44			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-2	0.05
A	RSMZ(SSS)	II-2	1.64
C	SRL	II-2	0.13
C	SRL	II-2	0.23
F	SRL	II-1	0.44

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	472004	**GDRCO No:**	472004
RPF:	Kegerreis,J	**CDF No:**	1-21-00099-Hum

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 472102 **GDRCO No:** 472102

RPF: Twohig, Skyler **CDF No:** 1-21-00088-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	913508	29.58	22.06	7.52				
B	913619	33.41	30.13		3.29			
C	913627	35.69	31.66	0.57	3.45			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 481501 **GDRCO No:** 481501

RPF: Vanderhorst, B. **CDF No:** 1-15-143H

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	830616	82.69			1.74			
B	820110	37.09	31.95	0.87	4.27			
C	820112	38.49	32.96	0.74	4.79			
D	821226	92.17			0.88			
E	821128	35.96	31.47	0.76	3.73			
F	821216	21.60	19.13		2.48			
G	821329	43.64	35.47	0.95	7.22			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	DSL	3A	1.57
B	DSL	II-2	1.65
C	SRL	3A	0.22
D	DSL	3A	0.44
E	SRL	3A	2.28

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	481501	**GDRCO No:**	481501
RPF:	Vanderhorst, B.	**CDF No:**	1-15-143H

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 481901 **GDRCO No:** 481901

RPF: Crocker, K. **CDF No:** 1-20-00026 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	833014	30.60	26.94	0.54	3.11			
B	833020	50.09	33.83	12.86	3.45			
C	833108	43.65	33.96	9.35	0.33			
D	823613	26.87	19.34	6.72	0.81			
E	720122	27.34	24.16		3.18			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 481901 **GDRCO No:** 481901

RPF: Crocker, K. **CDF No:** 1-20-00026 Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-2	3.60
B	SRL	1F	2.11
B	SRL	1F	0.20
B	SRL	1F	0.56
B	SRL	II-2	0.38
B	SRL	II-2	0.19
B	SRL	II-2	0.97
B	SRL	II-2	0.35
B	SRL	II-2	0.12
B	SRL	II-2	0.52
B	SRL	II-2	0.18
D	SRL	1F	0.18
D	SRL	II-2	0.47
D	SRL	II-2	0.60

Reason Retention Requirements Not Met:

***** N/A *****

B	SRL	1F	BASALARRATE	1.00

Reason Not Met: A portion of the no-harvest protection zone of unstable area B-3 was cut and logged constituting violation issuance to David Ives of Lords Light Logging (LTO) and Green Diamond Resource Company (LTO) from Calfire for breach of the THP. Required mitigations were conducted by the violating LTOs immediately following the issuance of the violations

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 482001 **GDRCO No:** 482001

RPF: Camper, L. **CDF No:** 1-20-00155-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	822712	19.12	17.21		1.91			
B	822620	25.03	21.67		3.36			
C	822501	28.05	21.44	6.60				
D	823403	18.20	12.18	3.39	2.63			
E	823410	46.66	35.33	11.33				
F	823505	24.40	21.77		2.62			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	RSMZ(SSS)	II-2	0.70
D	RSMZ(SSS)	II-2	0.26
D	RSMZ(SSS)	II-2	1.83

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	482001	**GDRCO No:**	482001
RPF:	Camper, L.	**CDF No:**	1-20-00155-HUM

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 511601 **GDRCO No:** 511601

RPF: Kirk,Christopher **CDF No:** 1-16-135HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	930408	33.21	29.78		3.43			
B	930407	35.54	28.94	6.60				
C	930720	29.19	26.42		2.77			
D	930816	32.78	29.54	0.91	2.33			
E	930920	27.77	24.72	1.49	1.55			
F	930919	23.70	21.49		2.21			
G	931707	29.08	25.48	1.16	2.43			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-2	0.10
D	DSL	II-1	0.74
E	SRL	II-1	0.10
E	SRL	II-1	0.10
E	SRL	II-1	0.10
G	SRL	II-1	0.10

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 511601

GDRCO No: 511601

RPF: Kirk,Christopher

CDF No: 1-16-135HUM

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
D	SRL	Alt Geology	II-1	0.00	0.10	Yes
	Reason Not Met?	N/A				
	Description	A shallow rapid landslide associated with the outboard road fill located adjacent to the northern boundary of unit D.				
D	SRL	Alt Geology	II-1	0.00	0.10	Yes
	Reason Not Met?	N/A				
	Description	A shallow rapid landslide associated with the outboard road fill located adjacent to the northern boundary of unit D..				
F	SRL	Alt Geology	II-1	0.10	0.10	Yes
	Reason Not Met?	N/A				
	Description	A shallow rapid landslide that initiated along the outboard fill of a legacy skid road and deposited downslope approximately 75 feet. The deposited material terminates on a gentle bench comprised of approximately 0-5% slope approximately 400 feet from the nearest watercourse.				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 511706 **GDRCO No:** 511706

RPF: Mohrmann, Z. **CDF No:** 1-17-143HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1033519	26.05	21.80	4.25				
B	1033518	33.94	30.39		3.55			
C	930205	36.45	31.38	3.22	1.85			
D	930316	33.45	25.03	2.40	6.03			
E	930312	19.63	17.02	1.01	1.59			
F	931004	33.21	28.85	1.93	2.44			
G	931022	32.51	28.58	3.93				

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	DSL	II-1	0.30
D	DSL	II-1	0.95
D	SRL	II-1	0.86

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	511706	**GDRCO No:**	511706
RPF:	Mohrmann, Z.	**CDF No:**	1-17-143HUM

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
D	SRL	Alt Geology	II-1	0.10	0.10	Yes
	Reason Not Met?	N/A				
	Description	There is a very small shallow rapid landslide located in the northern portion of unit D that measure approximately 20' wide by 20' tall. It is located approximately 125' away from the nearest watercourse on a slope which aspect parellels the watercourse.				
E	SRL	Alt Geology	II-1	0.54	0.10	Yes
	Reason Not Met?	N/A				
	Description	There are two Shallow Rapid Landslides located adjacent to the western boundary of unit E. This is the southern most slide.				
E	SRL	Alt Geology	II-1	0.50	0.10	Yes
	Reason Not Met?	N/A				
	Description	There is a Shallow Rapid Landslide located adjacent to the western boundary of unit E where an alternative to Green Diamond's ACHP default for shallow rapid landslides is proposed. .				
E	SRL	Alt Geology	II-1	0.37	0.10	Yes
	Reason Not Met?	N/A				
	Description	There is a Shallow Rapid Landslide located adjacent to the western boundary of unit E where an alternative to Green Diamond's ACHP defaults for shallow rapid landslides is proposed.				
D		Road constr. In RSMZ or SMZ				Yes
	Reason Not Met?	N/A				
	Description	There is a 75ft segment of proposed temporary road construction located within the RMZ of a class II watercourse.				

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 511801 **GDRCO No:** 511801

RPF: Cody,Reid **CDF No:** 1-18-092 HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	920336	36.00	31.46	4.46				
B	920116	72.44	28.02	44.43				
C	1023430	43.07	32.85	10.22				
D	1022613	38.61	27.37	9.13	2.10			
E	1022633	50.47	31.98	16.38	2.11			
F	1023505	38.48	32.08	6.40				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	SRL	II-2	2.24
E	SRL	1F	2.26

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	511801	**GDRCO No:**	511801
RPF:	Cody,Reid	**CDF No:**	1-18-092 HUM

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 512001 **GDRCO No:** 512001

RPF: Freeman,C **CDF No:** 1-20-00085 Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1033333	10.74			0.73			
B	1033334	21.23			1.35			
C	1032828	62.82			3.18			
D	1032736	99.57			16.78			
E	1032625	58.87			4.38			
F	1032624	64.20			2.46			

Riparian

Feature	Requirements Met?
II-1: Class II 1st Order	Yes
Ponds	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	561611	**GDRCO No:**	561611
RPF:	Satterlee, B.	**CDF No:**	1-17-057 HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1120340	23.52	21.25	0.82	1.46			
B	1120312	42.38	31.58	10.08	0.72			
C	1121120	35.17	32.49	1.12	1.56			
D	1121122	28.07	21.35	6.58	0.15			
E	1121124	29.09	24.63	1.92	2.55			
F	1121115	38.08	33.10	1.43	3.55			
G	1121431	37.30	24.77	12.52				
H	1121531	24.86	18.86	4.08	1.92			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561611 **GDRCO No:** 561611

RPF: Satterlee, B. **CDF No:** 1-17-057 HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-1	0.13
B	SRL	II-2	0.56
B	SRL	II-2	0.33
D	SRL	II-2	0.15
D	SRL	II-2	0.72
E	RSMZ(SSS)	II-2	1.32
F	RSMZ(SSS)	II-2	2.40

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561802 **GDRCO No:** 561802

RPF: Freeman,C **CDF No:** 1-19-00002-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1123412	35.77	24.88	10.90				
B	1123417	46.20	17.16	15.66	13.38			
C	1020310	35.72	32.08	3.64				
D	1122727	36.60	30.71	4.63	1.25			

Riparian

Feature	Requirements Met?
Class I	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	DSL	1F	7.39
B	SRL	1F	1.80
B	SRL	1F	1.25
B	SRL	1F	0.62
B	SRL	1F	2.28
B	SRL	II-1	0.28

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	561802	**GDRCO No:**	561802
RPF:	Freeman,C	**CDF No:**	1-19-00002-HUM

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561803 **GDRCO No:** 561803

RPF: East, R. **CDF No:** 1-18-00141HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1021733	29.46	23.45	4.91	1.10			
B	1021727	44.38	29.33	15.05				
C	1021738	72.26			16.25			
D	1021730	37.90	25.94	11.97				
E	1022020	39.95	28.75	8.21	2.98			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561804 **GDRCO No:** 561804

RPF: East, R. **CDF No:** 1-18-00173-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1122112	6.78	5.70	1.09				
B	1122216	35.77	32.13	3.23	0.42			
C	1122237	27.83	13.90	9.86	4.08			
D	1122708	32.62	17.85	13.74	1.03			
E	1122711	43.04	30.99	7.68	4.37			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-1	0.34
C	DSL	1F	1.66
C	DSL	II-2	0.50
C	SRL	1F	1.47
D	SRL	II-2	0.26
D	SRL	II-2	0.68
E	SRL	1F	2.63

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	561804	**GDRCO No:**	561804
RPF:	East, R.	**CDF No:**	1-18-00173-HUM

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561805

GDRCO No: 561805

RPF: East, R.

CDF No: 1-19-00040-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1223101	36.12	18.36	12.10	5.67			
B	1223016	35.64	13.09	10.79	11.76			
C	1222011	35.11	27.62	3.72	3.77			
D	1222022	40.72	31.79	3.59	5.34			
E	1222107	35.50	25.14	2.97	7.38			
F	1222118	29.54	19.23	2.23	8.08			
G	1222830	10.52	9.46	1.07				

Riparian

Feature	Requirements Met?
Class I	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561805 **GDRCO No:** 561805

RPF: East, R. **CDF No:** 1-19-00040-HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	DSL	1F	2.96
B	RSMZ(SSS)	1F	4.00
B	RSMZ(SSS)	1F	1.04
B	RSMZ(SSS)	II-2	6.63
B	RSMZ(SSS)	II-2	1.42
B	RSMZ(SSS)	II-2	0.74
B	SRL	1F	0.09
B	SRL	3A	0.24
B	SRL	II-2	0.23
C	RSMZ(SSS)	II-2	3.18
C	SMZ(SSS)	II-2	1.30
D	SMZ(SSS)	1F	1.65
E	RSMZ(SSS)	1F	6.53
E	SMZ(SSS)	1F	3.04
F	RSMZ(SSS)	1F	7.42
F	SMZ(SSS)	1F	0.36
F	SMZ(SSS)	1F	0.12
F	SMZ(SSS)	1F	0.94
F	SMZ(SSS)	1F	0.80
F	SMZ(SSS)	1F	0.06

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561806 **GDRCO No:** 561806

RPF: Dols, T. **CDF No:** 1-19-00094HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1223424	26.79	24.14	2.65				
B	1120426	37.25	28.72	7.63	0.90			
C	1120526	57.60	25.49	26.42	5.68			
D	1120324	47.94	24.06	4.68	19.20			
E	1120315	34.25	26.04	4.09	4.13			
F	1120918	47.14	20.69	9.43	17.01			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	1F	0.45
B	SMZ(SSS)	1F	0.39
B	SRL	1F	0.23
B	SRL	II-2	0.08
C	RSMZ(SSS)	II-2	2.81
C	SRL	1R	0.02
C	SRL	II-1	0.23
C	SRL	II-1	0.32

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C	SRL	II-1	0.09

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

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Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Geology

Unit	Feature	Watercourse	Acres of Retent.	Retent. Req. Met?
C	SRL	II-2	0.40	Yes
C	SRL	II-2	0.62	Yes
C	SRL	II-2	0.33	Yes
C	SRL	II-2	0.15	Yes
C	SRL	II-2	0.08	Yes
C	SRL	II-2	0.41	Yes
C	SRL	II-2	0.07	Yes
C	SRL	II-2	0.10	Yes
C	SRL	II-2	0.11	Yes
C	SRL	II-2	0.18	Yes
C	SRL	II-2	0.31	Yes
D	DSL	1F	14.48	Yes
D	RSMZ(SSS)	1F	1.92	Yes
D	RSMZ(SSS)	II-2	1.46	Yes
D	SMZ(SSS)	1F	0.95	Yes
D	SRL	II-1	0.09	Yes
D	SRL	II-2	0.07	Yes
D	SRL	II-2	0.09	Yes
D	SRL	II-2	0.14	Yes
E	RSMZ(SSS)	II-1	0.18	Yes
E	RSMZ(SSS)	II-2	3.23	Yes
E	SMZ(SSS)	II-1	0.32	Yes
E	SRL	II-2	0.09	No
E	SRL	II-2	0.18	No
F	DSL	1F	3.99	Yes
F	RSMZ(SSS)	1F	7.75	Yes
F	RSMZ(SSS)	II-1	1.66	Yes
F	RSMZ(SSS)	II-2	1.34	Yes
F	SMZ(SSS)	1F	3.43	Yes
F	SMZ(SSS)	II-1	0.92	Yes
F	SRL	1F	0.12	Yes

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Geology

Unit	Feature	Watercourse	Acres of Retent.	Retent. Req. Met?
F	SRL	1F	0.34	Yes
F	SRL	II-1	0.16	Yes
F	SRL	II-1	0.75	Yes

Reason Retention Requirements Not Met:

***** N/A *****

E	SRL	II-2	BASALARRATE	0.00
Reason Not Met:	The portion of the landslide extending beyond the SSS was not flagged in the field prior to the commencement of operations. This resulted in the LTO cutting and harvesting a .25 acre portion of the mapped landslide and buffer outside of the SSS.			
E	SRL	II-2	BASALARRATE	0.00
Reason Not Met:	The portion of the landslide extending beyond the SSS was not flagged in the field prior to the commencement of operations. This resulted in the LTO cutting and harvesting a .25 acre portion of the mapped landslide and buffer outside of the SSS.			

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
F	DSL	Alt Geology	1F	1.17		Yes
Reason Not Met?		N/A				
Description		Selection harvest on a Deep Seated Landslide				
F	DSL	Rd const on DSL	1F	1.17		Yes
Reason Not Met?		N/A				
Description		Road construction across an active/historic landslide.				

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	561901	**GDRCO No:**	561901
RPF:	MahonyMoyer, Evan	**CDF No:**	1-19-00156HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1220935	35.15	31.20	1.08	2.88			
B	1220930	31.27	16.79	10.99	3.49			
C	1220710	34.03	26.20	5.07	2.77			
D	1211301	55.25	35.71	13.61	5.92			
E	1221607	28.13	14.80	12.24	1.09			
F	1222122	33.73	28.87		4.85			
G	1222211	51.58	23.01	23.64	4.94			
H	1222829	49.27	37.33	4.72	7.21			

Riparian

Feature	Requirements Met?
Class I	Yes
Class I	Yes
Class III Tier A	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 561901 **GDRCO No:** 561901

RPF: MahonyMoyer, Evan **CDF No:** 1-19-00156HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-1	0.11
A	RSMZ(SSS)	II-1	0.60
A	SMZ(SSS)	II-1	0.26
A	SRL	3B	0.71
A	SRL	II-1	0.71
B	RSMZ(SSS)	1F	0.81
B	RSMZ(SSS)	II-1	1.19
B	SRL	1F	0.69
B	SRL	II-1	0.26
C	RSMZ(SSS)	II-1	2.08
D	SRL	1F	0.60
D	SRL	1F	1.38
D	SRL	1F	0.12
D	SRL	II-1	1.03
D	SRL	II-1	2.50
H	SMZ(SSS)	1F	2.67
H	SMZ(SSS)	II-1	0.31
H	SRL	1F	0.31
H	SRL	II-1	0.23

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 562001 **GDRCO No:** 562001

RPF: Dols, T. **CDF No:** 1-21-00023-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1221924	28.87	15.18	12.33	1.37			
B	1221819	25.53	22.34	0.98	2.26			
C	1221708	36.54	29.05	4.91	2.58			
D	1221705	28.78	17.29	11.04	0.46			
E	1221723	26.44	23.22	3.22				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	SMZ(SSS)	II-2	0.49
C	SRL	1F	2.45
C	SRL	II-2	0.19
D	SMZ(SSS)	1F	0.44

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	562001	**GDRCO No:**	562001
RPF:	Dols, T.	**CDF No:**	1-21-00023-Hum

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 562002 **GDRCO No:** 562002

RPF: Freeman,C **CDF No:** 1-20-00213-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1021724	23.36	20.83	2.53				
B	1021734	30.95	27.39	3.06	0.51			
C	1021622	31.60	21.77	9.56	0.27			
D	1022003	26.68	24.25	1.91	0.51			
E	1022026	26.29	20.42	5.86				
F	1022013	27.50	19.86	7.64				
G	1022117	27.22	23.64	0.79	2.80			
H	1022908	32.64	25.12	7.52				
I	1022907	29.59	20.60	8.61	0.37			
J	1022821	18.33	15.97	2.15	0.21			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 562002 **GDRCO No:** 562002

RPF: Freeman,C **CDF No:** 1-20-00213-Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	SRL	1F	0.10
C	SRL	II-2	0.11
J	SRL	II-1	0.21

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 611801

GDRCO No: 611801

RPF: Cody,Reid

CDF No: 1-18-103 HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1220607	34.51	24.43	4.61	5.47			
B	1210104	40.79	32.30	8.49				
C	1210123	31.71	22.36	2.47	6.87			
D	1220620	42.15	31.58	10.47	0.09			
E	1220606	34.34	25.70	4.97	3.67			
F	1210125	39.99	29.12	10.87				
G	1220612	40.40	30.69	9.30	0.42			
H	1220616	38.69	30.84	6.11	1.74			
I	1211205	35.70	27.79	7.71	0.20			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 611801 **GDRCO No:** 611801

RPF: Cody,Reid **CDF No:** 1-18-103 HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	1F	3.98
A	SRL	1F	0.65
A	SRL	II-1	0.69
D	SRL	1F	0.08
E	RSMZ(SSS)	1F	2.68
E	SRL	II-1	0.43
E	SRL	II-1	0.46
G	SRL	II-1	0.08
G	SRL	II-1	0.17
H	DSL	II-1	0.26
H	DSL	II-1	0.43
H	RSMZ(SSS)	II-1	0.90
H	SRL	II-1	0.13
H	SRL	II-1	0.47
I	SRL	II-1	0.19

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 611901

GDRCO No: 611901

RPF: Dobosh, B.

CDF No: 1-20-00177-Hum

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1323207	22.13	15.19	6.94				
B	1323213	35.48	19.15	14.55	1.78			
C	1220526	41.59	28.41	12.31	0.86			
D	1220416	32.39	29.69	2.23	0.47			
E	1220524	29.99	18.53	8.86	2.60			
F	1220511	30.52	17.46	12.00	1.06			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 611901 **GDRCO No:** 611901

RPF: Dobosh, B. **CDF No:** 1-20-00177-Hum

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-2	0.83
B	SMZ(SSS)	II-2	0.10
B	SRL	1F	0.25
B	SRL	1F	0.77
C	SRL	1F	0.18
C	SRL	1F	0.51
D	RSMZ(SSS)	II-1	0.14
D	SMZ(SSS)	II-1	0.05
D	SRL	NA	0.34
E	RSMZ(SSS)	II-2	0.48
E	SMZ(SSS)	II-2	0.08
E	SRL	1F	0.78
E	SRL	II-2	0.99
F	RSMZ(SSS)	II-2	0.79
F	SMZ(SSS)	II-2	0.17
F	SRL	II-1	0.19
F	SRL	II-1	0.15

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 661701

GDRCO No: 661701

RPF: Satterlee, B.

CDF No: 1-18-006DEL-HUM

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1322907	51.64	31.98	1.20	18.46			
B	1323223	31.44	28.09	0.59	2.76			
C	1323111	32.04	21.47	10.57				
D	1220602	33.53	27.17	6.35				
E	1220604	20.44	17.80		2.64			
F	1220518	27.96	24.31	1.22	2.43			
G	1220502	30.90	25.46	5.43				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 661701 **GDRCO No:** 661701

RPF: Satterlee, B. **CDF No:** 1-18-006DEL-HUM

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	1F	8.95
B	SRL	3B	0.26
B	SRL	3B	0.17
B	SRL	II-1	0.28
B	SRL	II-1	0.24

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 661901

GDRCO No: 661901

RPF: Hurst, R.

CDF No: 1-19-00142-DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1312315	25.75	21.15	4.60				
B	1312319	25.37	18.27	6.77	0.32			
C	1312420	30.14	14.42	7.48	8.23			
D	1312518	34.22	23.72	8.90	1.61			
E	1312608	31.63	27.84	3.80				
F	1312625	27.19	18.55	8.64				
G	1312610	35.69	27.06	8.29	0.34			
H	1312611	36.07	26.48	9.54	0.05			
I	1312321	21.84	19.49	1.84	0.52			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 661901 **GDRCO No:** 661901

RPF: Hurst, R. **CDF No:** 1-19-00142-DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-1	0.30
B	SRL	II-1	0.16
C	RSMZ(SSS)	1F	2.98
C	SMZ(SSS)	1F	1.13
C	SRL	II-1	0.13
C	SRL	II-2	0.72
C	SRL	II-2	0.55
C	SRL	II-2	0.08
D	RSMZ(SSS)	1F	0.97
D	SMZ(SSS)	1F	0.68
D	SRL	1F	0.48
G	SRL	II-1	0.13
G	SRL	II-2	0.19
G	SRL	II-2	0.19
H	SRL	II-2	0.11
H	SRL	II-2	0.05

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 662001

GDRCO No: 662001

RPF: Freeman,C

CDF No: 1-20-00061 Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1312530	39.83	22.51	2.99	14.33			
B	1313516	35.31	24.54	10.31	0.46			
C	1210225	30.61	19.37	6.99	4.25			
D	1210235	20.61	17.79		2.81			
E	1210130	21.06	18.95		2.11			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 662001 **GDRCO No:** 662001

RPF: Freeman,C **CDF No:** 1-20-00061 Del

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	CMZ	1F	2.36
A	RSMZ(SSS)	1F	0.83
A	SMZ(SSS)	1F	0.14
B	SRL	3A	0.31
B	SRL	II-1	0.28
B	SRL	II-1	0.13
B	SRL	MOD3A	0.18
C	RSMZ(SSS)	1F	1.59

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 662002 **GDRCO No:** 662002

RPF: Hurst, R. **CDF No:** 1-20-00210-DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1312520	32.38	22.32	6.90	3.16			
B	1323024	26.11	22.86	3.25				
C	1313624	33.99	24.42	9.57				
D	1313619	32.18	28.51	3.67				
E	1313612	27.19	23.89	3.30				

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-1	2.38
A	SMZ(SSS)	II-1	1.60
A	SRL	II-1	0.26
A	SRL	II-1	0.46

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	662002	**GDRCO No:**	662002
RPF:	Hurst, R.	**CDF No:**	1-20-00210-DEL

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 711804 **GDRCO No:** 711804

RPF: Coulter,E **CDF No:** 1-19-00120DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1512718	37.27	25.07	12.00	0.20			
B	1513331	44.20	28.19	15.12	0.90			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	SRL	II-1	0.15
B	SRL	II-2	0.14
B	SRL	II-2	0.67

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 711903

GDRCO No: 711903

RPF: Hurst, R.

CDF No: 1-19-00220DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1410329	37.76	13.73	13.08	10.94			
B	1410425	15.58	12.14	3.44				
C	1410915	37.08	27.13	6.48	3.47			
D	1410919	37.34	25.17	8.18	3.98			
E	1411734	38.62	31.13	6.79	0.71			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 711903 **GDRCO No:** 711903

RPF: Hurst, R. **CDF No:** 1-19-00220DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	SRL	1R	10.51
A	SRL	1R	3.00
C	SRL	1R	0.15
C	SRL	1R	0.90
C	SRL	3B	0.16
C	SRL	II-1	0.86
C	SRL	II-1	1.73
C	SRL	II-2	1.17
D	SRL	II-1	2.43
D	SRL	II-1	0.72
D	SRL	II-1	0.76
D	SRL	II-1	1.05

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 712001 **GDRCO No:** 712001

RPF: Freeman,C **CDF No:** 1-20-00118-Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1410620	10.56	9.54		1.02			
B	1410623	44.96	33.05	3.92	7.99			
C	1513329	29.98	26.30	3.68				

Riparian

Feature	Requirements Met?
Class I	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 731901 **GDRCO No:** 731901

RPF: Hurst, R. **CDF No:** 1-19-00221DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1423117	23.78	20.86	2.37	0.56			
B	1423132	15.51	13.60	0.15	1.76			
C	1423119	20.21	17.89		2.32			
D	1311234	17.13	13.86	2.43	0.84			

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-1	0.14
B	SRL	II-1	0.15

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

Unit	Feature	Exception	Watercourse	Acres of Retention	Clearcut Acres	Exception Met?
B	SRL	Alt Geology	II-1	1.00		Yes
	Reason Not Met?	N/A				
	Description	No harvest				

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 732001

GDRCO No: 732001

RPF: Coulter,E

CDF No: 1-21-00080-Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1413628	35.02	31.04	3.99				
B	1310112	35.93	30.49	5.31	0.12			
C	1310221	24.42	20.57	3.85				
D	1320615	27.45	15.14	11.57	0.74			
E	1310219	42.43	29.39	11.96	1.07			
F	1311127	26.53	23.93	1.61	0.99			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 732001 **GDRCO No:** 732001

RPF: Coulter,E **CDF No:** 1-21-00080-Del

Geology

Unit	Feature	Watercourse	Acres of Retent.
D	SRL	1F	0.16
D	SRL	1F	0.42
D	SRL	1F	0.30
D	SRL	II-1	0.13
D	SRL	II-1	0.15
E	RSMZ(SSS)	1F	0.97
E	SMZ(SSS)	1F	0.91
F	SRL	3A	0.14

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 851602 **GDRCO No:** 851602

RPF: Dobosh, B. **CDF No:** 1-18-007DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1423433	32.58	14.84	8.43	9.31			
B	1423435	33.31	12.44	9.98	10.88			
C	1320406	22.77	19.13	3.11	0.54			
D	1320833	64.62		4.17	11.42			
E	1321715	26.73	23.68		3.05			
F	1321010	18.37	13.23	2.27	2.86			
G	1321019	35.18	17.74	14.53	2.91			
H	1321527	36.62	31.42	1.30	3.89			
I	1321519	17.93	8.72	8.28	0.93			
J	1321517	8.47	7.07		1.40			
K	1320830	23.06	17.97	1.77	3.31			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	1F	3.24
A	RSMZ(SSS)	1F	2.12

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

A	SMZ(SSS)	1F	0.50

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

Geology

Unit	Feature	Watercourse	Acres of Retent.	Retent. Req. Met?
A	SMZ(SSS)	1F	3.47	Yes
A	SRL	1F	1.29	Yes
A	SRL	II-2	0.53	Yes
A	SRL	II-2	0.05	Yes
A	SRL	II-2	0.24	Yes
A	SRL	II-2	0.36	Yes
B	SRL	II-2	0.28	Yes
B	SRL	II-2	0.28	Yes
B	SRL	II-2	0.34	Yes
B	SRL	II-2	0.45	Yes
C	SRL	II-1	0.47	Yes
C	SRL	II-2	0.03	Yes
F	RSMZ(SSS)	II-2	2.03	Yes
F	RSMZ(SSS)	II-2	0.46	Yes
F	SRL	II-2	0.07	Yes
G	SRL	II-1	0.15	Yes
G	SRL	II-2	1.05	Yes
G	SRL	II-2	2.59	Yes
H	SRL	II-1	0.19	Yes
H	SRL	II-1	0.43	Yes
I	DSL	II-1	0.05	Yes
I	DSL	II-1	0.13	Yes
I	DSL	II-2	0.52	Yes
I	DSL	II-2	0.23	Yes
K	HWS	II-1	0.50	Yes
K	HWS	II-1	0.76	Yes
K	RSMZ(SSS)	II-1	2.24	Yes
K	RSMZ(SSS)	II-2	0.30	Yes

Reason Retention Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 851602

GDRCO No: 851602

RPF: Dobosh, B.

CDF No: 1-18-007DEL

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 851801 **GDRCO No:** 851801

RPF: Dobosh, B. **CDF No:** 1-18-177-DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1423220	31.55	27.79	3.00	0.76			
B	1423322	24.48	18.80	5.08	0.60			
C	1423314	18.63	13.44	4.08	1.11			
D	1320426	31.32	25.03	6.29				
E	1320407	26.74	23.80	2.94				

Riparian

Feature	Requirements Met?
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-2	0.68
A	SRL	II-1	0.04
B	RSMZ(SSS)	II-2	0.55
C	SRL	II-1	1.03
C	SRL	II-1	0.34

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	851801	**GDRCO No:**	851801
RPF:	Dobosh, B.	**CDF No:**	1-18-177-DEL

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 851803 **GDRCO No:** 851803

RPF: Dobosh, B. **CDF No:** 1-20-00013 Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1421724	70.21			4.21			
B	1421626	60.23		0.03	12.80			
C	1422026	31.37	27.54	2.72	1.11			
D	1421917	36.43	31.98	2.93	1.51			
E	1422035	41.72			2.94			
F	1422027	16.66	12.66	4.00				
G	1422115	39.69	29.23	5.66	4.80			
H	1422932	23.67	21.15		2.52			
I	1422942	29.08			4.59			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 851803 **GDRCO No:** 851803

RPF: Dobosh, B. **CDF No:** 1-20-00013 Del

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	SRL	II-1	0.17
B	SRL	NA	0.04
G	RSMZ(SSS)	1F	4.07
G	SMZ(SSS)	1F	0.72
G	SRL	1F	0.54

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 852001

GDRCO No: 852001

RPF: Dobosh, B.

CDF No: 1-21-00004-Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1423401	29.68	26.55	1.57	1.56			
B	1423335	39.14	20.67	17.56	0.92			
C	1320318	31.55	14.39	14.15	3.01			
D	1320431	34.35	24.63	2.57	7.16			
E	1320928	32.64	26.51	5.72	0.41			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 852001 **GDRCO No:** 852001

RPF: Dobosh, B. **CDF No:** 1-21-00004-Del

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-2	0.50
B	SRL	NA	-
B	SRL	NA	0.39
C	SRL	1F	1.82
C	SRL	II-1	0.12
C	SRL	II-2	1.13
D	RSMZ(SSS)	II-2	1.18
D	RSMZ(SSS)	II-2	3.15
D	SMZ(SSS)	II-2	0.50
D	SMZ(SSS)	II-2	0.47
D	SRL	II-1	0.09
D	SRL	II-1	0.06
D	SRL	II-2	0.83
D	SRL	II-2	1.62
E	DSL	II-2	0.41
E	SRL	NA	0.55
E	SRL	NA	0.12

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 901901 **GDRCO No:** 901901

RPF: Freeman,C **CDF No:** 1-19-00212DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1710621	321.98			30.27			
B	1710622	60.82			9.85			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes
Seeps/Springs	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 901901 **GDRCO No:** 901901

RPF: Freeman,C **CDF No:** 1-19-00212DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	DSL	3A	3.22
A	RSMZ(SSS)	II-2	0.68
A	SRL	II-1	0.27
A	SRL	II-1	0.07
A	SRL	II-1	0.21
A	SRL	II-2	0.05
B	RSMZ(SSS)	II-1	0.38
B	SRL	II-1	0.01

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 902101 **GDRCO No:** 902101

RPF: Freeman,C **CDF No:** 1-21-00102-Del

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1803623	36.05	29.25	5.05	1.75			
B	1803615	38.67	29.37	6.70	2.61			
C	1803613	13.88	9.95	3.93				
D	1700101	24.50	19.63	4.94				

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	1F	1.58
B	SRL	1F	0.07
B	SRL	1F	0.10
B	SRL	1F	0.10
B	SRL	1F	0.29

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	902101	**GDRCO No:**	902101
RPF:	Freeman,C	**CDF No:**	1-21-00102-Del

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 931702 **GDRCO No:** 931702

RPF: Dobosh, B. **CDF No:** 1-18-106 DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1800406	36.59	23.71	0.78	12.10			
B	1800331	36.42	30.36	5.33	0.73			
C	1903419	35.80	12.36	18.87	4.57			
D	1800321	29.03	18.51	10.19	0.32			
E	1800241	49.78	32.42	14.75	2.61			
F	1913601	52.21	26.25	24.67	1.35			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier B	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 931702 **GDRCO No:** 931702

RPF: Dobosh, B. **CDF No:** 1-18-106 DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
A	RSMZ(SSS)	II-2	0.25
A	RSMZ(SSS)	II-2	0.88
A	SRL	II-2	0.15
A	SRL	II-2	0.12
B	SRL	II-1	0.06
C	DSL	1F	0.35
C	DSL	1F	0.01
D	RSMZ(SSS)	II-1	0.49
E	HWS	3A	0.24
E	HWS	3A	0.17
E	SRL	3A	0.17
E	SRL	3A	0.11
F	SRL	1F	0.10
F	SRL	1F	0.28
F	SRL	1F	0.16

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 931903

GDRCO No: 931903

RPF: Freeman,C

CDF No: 1-19-00199DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1811826	22.17	15.02	6.00	1.20			
B	1811721	46.98	31.58	11.04	4.36			
C	1811727	21.09	14.75	3.81	2.62			
D	1811827	17.15	10.93	6.23				
E	1811915	15.47	5.11	8.90	1.46			
F	1812015	22.30	14.05	6.63	1.61			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 931903 **GDRCO No:** 931903

RPF: Freeman,C **CDF No:** 1-19-00199DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
B	RSMZ(SSS)	II-1	1.13
B	SRL	II-1	0.05
B	SRL	II-1	0.71
B	SRL	II-1	0.90
B	SRL	II-2	0.75
C	DSL	II-2	0.24
C	DSL	II-2	0.67
C	RSMZ(SSS)	II-1	0.72
C	RSMZ(SSS)	II-1	0.64
E	RSMZ(SSS)	1F	1.12
E	SRL	1F	0.03
E	SRL	1F	0.03
F	RSMZ(SSS)	1F	1.29

Reason Retention Requirements Not Met:

***** N/A *****

C	DSL	II-2	BASALARRATE	
	Reason Not Met:	The unit was logged as FBYL, the contractors subcontractors for falling cut through the unstable area.		

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

AHCP Post Harvest Report

GREEN DIAMOND RESOURCE COMPANY

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 951701 **GDRCO No:** 951701

RPF: Freeman,C **CDF No:** 1-18-107DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1701303	20.83	18.33	2.50				
B	1701302	24.10	21.33	2.77				
C	1702410	34.61	30.63	3.67	0.31			
D	1702407	26.78	20.44	6.02	0.31			
E	1702209	32.45	28.15	4.30				
F	1702207	34.89	29.30	5.59				
G	1702211	34.93	19.17	13.06	2.69			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
Class III Tier A Modified	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
II-FPR: Class II Forest Practice Rules	Yes
Wet areas	Yes

Reason Requirements Not Met:

***** N/A *****

Geology

***** None *****

Reason Retention Requirements Not Met:

***** N/A *****

AHCP Exceptions:

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name:	951701	**GDRCO No:**	951701
RPF:	Freeman,C	**CDF No:**	1-18-107DEL

Additional Comments

***** None *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 981801 **GDRCO No:** 981801

RPF: Hurst, R. **CDF No:** 1-19-00021-DEL

Units

Unit	TTRRSSLL	Gross Acres	Clear Cut Acres	Selection Acres	No Harvest Acres	In Unit ROW Acres	Out Unit ROW Acres	Other Acres
A	1312102	15.46	13.78	1.69				
B	1312227	29.67	26.22	0.51	2.94			
C	1312221	10.58	6.18	4.27	0.13			
D	1312205	37.76	24.12	5.74	2.32			

Riparian

Feature	Requirements Met?
Class I	Yes
Class III Tier A	Yes
II-1: Class II 1st Order	Yes
II-2: Class II 2nd Order	Yes
Seeps/Springs	Yes

Reason Requirements Not Met:

***** N/A *****

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

THP Name: 981801 **GDRCO No:** 981801

RPF: Hurst, R. **CDF No:** 1-19-00021-DEL

Geology

Unit	Feature	Watercourse	Acres of Retent.
C	SRL	II-1	0.10
C	SRL	II-1	0.10
D	RSMZ(SSS)	II-1	1.00
D	RSMZ(SSS)	II-1	0.59
D	SMZ(SSS)	II-1	0.63
D	SMZ(SSS)	II-1	0.25
D	SMZ(SSS)	II-1	0.28
D	SRL	1F	0.42
D	SRL	1F	0.29
D	SRL	1F	0.44
D	SRL	II-1	0.31
D	SRL	II-1	0.12

GREEN DIAMOND RESOURCE COMPANY

AHCP Post Harvest Report

Reason Retention Requirements Not Met:
Begin Date: 1/1/2021, End Date: 12/31/2022, Status: Completed

***** N/A *****

AHCP Exceptions:

***** None *****

Additional Comments

***** None *****

Appendix B

Summary Table of Road Treatment Implementation and Effectiveness Monitoring Results from 2021 and 2022

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
091501	1-15-068H	05	Nov 17 2022	H. Weaver			No	Functional	
091501	1-15-068H	08	Sep 23 2022	L. Judevine			No	Functional	
092001	1-21-00011-Hum	01	Jan 4 2022	H. Weaver	Aug 15 2022	Others	No	Functional	
092001	1-21-00011-Hum	02	Jan 4 2022	H. Weaver	Aug 26 2022	Others	No	Functional	
092001	1-21-00011-Hum	03	Jan 4 2022	H. Weaver	Aug 15 2022	Others	No	Functional	
092001	1-21-00011-Hum	04	Nov 22 2021	E. Haffner	Aug 15 2022	Others	No	Functional	
092001	1-21-00011-Hum	08	Nov 3 2022	H. Weaver			No	Functional	
092001	1-21-00011-Hum	09	Nov 3 2022	H. Weaver			No	Functional	
092001	1-21-00011-Hum	10	Nov 3 2022	H. Weaver			No	Functional	
092001	1-21-00011-Hum	11	Nov 3 2022	H. Weaver			No	Functional	
092001	1-21-00011-Hum	RH-1000_01	Nov 17 2022	H. Weaver			No	Functional	
141402	1-14-119H	PWA 135	Sep 18 2020	J. Wright	Aug 19 2021	N. Ludington	No	Functional	
142001	1-20-00124-Hum	01	Dec 28 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
142001	1-20-00124-Hum	02	Nov 11 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
142001	1-20-00124-Hum	03	Nov 11 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
142001	1-20-00124-Hum	04	Dec 28 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
142001	1-20-00124-Hum	05	Dec 28 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
142001	1-20-00124-Hum	06	Nov 11 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
151801	1-18-085 HUM	03	Oct 29 2020	N. Ludington	Jul 8 2021	Others	No	Functional	
151802	1-18-161HUM	02	Dec 16 2021	H. Weaver			No	Functional	
152001	1-21-00022-Hum	1	Nov 4 2021	E. Haffner	Aug 5 2022	Others	No	Functional	
152001	1-21-00022-Hum	2	Nov 10 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
171602	1-16-138H	10	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171602	1-16-138H	13	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171602	1-16-138H	14	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171602	1-16-138H	17	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171602	1-16-138H	18	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171602	1-16-138H	19	Sep 30 2020	J. Wright	Nov 11 2021	H. Weaver	No	Functional	
171602	1-16-138H	21	Sep 30 2020	J. Wright	Nov 8 2021	H. Weaver	No	Functional	
171901	1-19-00140-HUM	03	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	04	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	05	Sep 30 2020	J. Wright	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	06	Sep 30 2020	J. Wright	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	07	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	08	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	12	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	13	Nov 19 2020	M. Cameron	May 25 2021	Others	No	Functional	
171901	1-19-00140-HUM	14	Nov 19 2020	M. Cameron	Jun 30 2021	Others	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
171901	1-19-00140-HUM	15	Nov 19 2020	M. Cameron	Jun 30 2021	Others	No	Functional	
172002	1-21-00049-Hum	01	Oct 20 2022	T. Wills-Pendley			No	Functional	
172002	1-21-00049-Hum	02	Oct 24 2022	T. Wills-Pendley			No	Functional	
172002	1-21-00049-Hum	03	Oct 20 2022	T. Wills-Pendley			No	Functional	
172002	1-21-00049-Hum	04	Oct 24 2022	T. Wills-Pendley			No	Functional	
172002	1-21-00049-Hum	05	Oct 24 2022	T. Wills-Pendley			No	Functional	
172002	1-21-00049-Hum	06	Oct 20 2022	T. Wills-Pendley			No	Functional	
182001	1-20-00207-Hum	01	Mar 8 2022	T. Wills-Pendley	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	02	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	03	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	04	Oct 11 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	05	Nov 8 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	07	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	08	Oct 11 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	09	Oct 11 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	10	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	14	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	15	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	16	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	17	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	18	Oct 11 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	19	Jul 7 2022	N. Ludington	Dec 22 2022	Others	No	Functional	Construction halted due to winter weather in 2021. Completed 2022.
182001	1-20-00207-Hum	21	Nov 1 2021	N. Ludington	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	22	Nov 17 2021	H. Weaver	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	24	Nov 1 2021	N. Ludington	Dec 22 2022	N. Ludington	No	Functional	Construction halted in 2021 due to winter weather. Completed in 2022.
182001	1-20-00207-Hum	25	Nov 1 2021	N. Ludington	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	27	Nov 1 2021	N. Ludington	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	28	Nov 1 2021	N. Ludington	Jul 7 2022	N. Ludington	No	Functional	
182001	1-20-00207-Hum	29	Nov 1 2021	N. Ludington	Jul 7 2022	N. Ludington	No	Functional	
191801	1-19-00074-HUM	01	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	02	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	05	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	06	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	07	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	08	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	09	Nov 29 2022	Others			No	Functional	
191801	1-19-00074-HUM	10	Nov 29 2022	Others			No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
221901	1-19-00164HUM	05	Oct 23 2020	M. Cameron	Sep 20 2021	H. Weaver	No	Functional	
221901	1-19-00164HUM	06	Oct 23 2020	M. Cameron	Oct 7 2021	H. Weaver	No	Functional	
221901	1-19-00164HUM	07	Oct 23 2020	M. Cameron	Sep 20 2021	H. Weaver	No	Functional	
221901	1-19-00164HUM	10	Oct 29 2020	M. Cameron	Sep 20 2021	H. Weaver	No	Functional	
221901	1-19-00164HUM	11	Oct 23 2020	M. Cameron	Sep 29 2021	H. Weaver	No	Functional	
221901	1-19-00164HUM	AM01	Dec 28 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
222001	1-21-00124-Hum	01	Sep 22 2022	Others			No	Functional	
222001	1-21-00124-Hum	02	Sep 26 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	03	Sep 26 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	04	Sep 26 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	10	Sep 14 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	11	Sep 14 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	12	Sep 14 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	16	Oct 3 2022	Others			No	Functional	
222001	1-21-00124-Hum	18	Oct 10 2022	Others			No	Functional	
222001	1-21-00124-Hum	19	Oct 10 2022	Others			No	Functional	
222001	1-21-00124-Hum	20	Oct 10 2022	Others			No	Functional	
222001	1-21-00124-Hum	21	Oct 10 2022	Others			No	Functional	
222001	1-21-00124-Hum	22	Dec 2 2022	Others			No	Functional	
222001	1-21-00124-Hum	23	Dec 2 2022	Others			No	Functional	
222001	1-21-00124-Hum	26	Oct 12 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	27	Oct 12 2022	H. Weaver			No	Functional	
222001	1-21-00124-Hum	28	Sep 30 2022	Others			No	Functional	
222001	1-21-00124-Hum	29	Sep 30 2022	Others			No	Functional	
222001	1-21-00124-Hum	30	Nov 29 2022	Others			No	Functional	
241901	1-20-00019HUM	02	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	04	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	05	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	06	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	07	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	08	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	09	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	10	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	11	Oct 5 2020	M. Lewis	May 13 2021	Others	No	Functional	
241901	1-20-00019HUM	12	Oct 28 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
241901	1-20-00019HUM	13	Nov 3 2020	M. Lewis	Jun 21 2021	Others	No	Functional	
241901	1-20-00019HUM	14	Sep 24 2020	M. Cameron	Jun 21 2021	Others	No	Functional	
241901	1-20-00019HUM	15	Sep 24 2020	M. Cameron	May 13 2021	Others	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
241901	1-20-00019HUM	17	Oct 28 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
241901	1-20-00019HUM	18	Sep 24 2020	M. Cameron	May 13 2021	Others	No	Functional	
242001	1-21-00016-Hum	15	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	16	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	17	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	18	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	19	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	20	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	21	Sep 23 2022	T. Wills-Pendley			No	Functional	
242001	1-21-00016-Hum	22	Sep 23 2022	T. Wills-Pendley			No	Functional	
261801	1-18-00109 HUM	03	Sep 12 2022	L. Judevine			No	Functional	
261801	1-18-00109 HUM	06	Nov 8 2022	Others			No	Functional	
261901	1-19-00161 HUM	02	Oct 2 2020	M. Lewis	Sep 8 2021	H. Weaver	No	Functional	
261901	1-19-00161 HUM	08	Nov 19 2021	E. Haffner	Aug 5 2022	Others	No	Functional	
261901	1-19-00161 HUM	09	Sep 8 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
261901	1-19-00161 HUM	10	Oct 28 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
262002	1-21-00019-Hum	03	Dec 28 2021	T. Wills-Pendley			No	Functional	
262002	1-21-00019-Hum	04	Dec 28 2021	T. Wills-Pendley			No	Functional	
262002	1-21-00019-Hum	05	Nov 18 2021	E. Haffner			No	Functional	
262002	1-21-00019-Hum	06	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	07	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	09	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	11	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	12	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	13	Oct 31 2022	H. Weaver			No	Functional	
262002	1-21-00019-Hum	14	Oct 13 2022	Others			No	Functional	
262002	1-21-00019-Hum	15	Oct 13 2022	Others			No	Functional	
262002	1-21-00019-Hum	16	Oct 13 2022	Others			No	Functional	
262002	1-21-00019-Hum	18	Oct 31 2022	H. Weaver			No	Functional	
271801	1-18-084HUM	11	Oct 31 2022	H. Weaver			No	Functional	
271901	1-20-00012HUM	1	Oct 5 2020	M. Lewis	Sep 24 2021	M. Lewis	No	Functional	
271901	1-20-00012HUM	2	Oct 5 2020	M. Lewis	Sep 24 2021	M. Lewis	No	Functional	
272001	1-21-00046-Hum	01	Oct 31 2022	H. Weaver			No	Functional	
272001	1-21-00046-Hum	02	Sep 7 2021	M. Lewis	Sep 16 2022	T. Wills-Pendley	No	Functional	
272001	1-21-00046-Hum	03	Sep 7 2021	M. Lewis	Sep 16 2022	T. Wills-Pendley	No	Functional	
272001	1-21-00046-Hum	04	Sep 7 2021	M. Lewis	Sep 16 2022	T. Wills-Pendley	No	Functional	
272001	1-21-00046-Hum	05	Oct 31 2022	H. Weaver			No	Functional	
272101	1-22-00059-Hum	2	Nov 30 2022	Others			No	Functional	

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272101	1-22-00059-Hum	3	Nov 30 2022	Others			No	Functional	
272101	1-22-00059-Hum	8	Nov 29 2022	Others			No	Functional	
272101	1-22-00059-Hum	9	Nov 29 2022	Others			No	Functional	
341601	1-17-031H	18	Oct 4 2021	H. Weaver			No	Functional	
401901	1-20-00005HUM	1	Oct 5 2020	M. Lewis	Jul 6 2021	Others	No	Functional	
402001	1-21-00017-Hum	01	Oct 6 2021	H. Weaver	Aug 1 2022	Others	No	Functional	
402001	1-21-00017-Hum	02	Oct 6 2021	H. Weaver	Aug 1 2022	Others	Yes	Functional	Culvert has separated, possible water flow under pipe
402001	1-21-00017-Hum	03	Oct 6 2021	H. Weaver	Aug 1 2022	Others	No	Functional	
402001	1-21-00017-Hum	04	Oct 6 2021	H. Weaver	Jul 28 2022	Others	No	Functional	
402001	1-21-00017-Hum	05	Oct 6 2021	H. Weaver	Jul 28 2022	Others	No	Functional	
402001	1-21-00017-Hum	06	Oct 22 2021	H. Weaver	Jul 28 2022	Others	No	Functional	
402001	1-21-00017-Hum	07	Oct 22 2021	H. Weaver	Jul 28 2022	Others	No	Functional	
402001	1-21-00017-Hum	09	Sep 8 2021	H. Weaver	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	10	Sep 8 2021	H. Weaver	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	15	Sep 8 2021	H. Weaver	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	16	Sep 8 2021	H. Weaver	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	19	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	20	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	21	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	21.1	Dec 14 2021	T. Wills-Pendley	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	22	Aug 22 2022	T. Wills-Pendley			No	Functional	
402001	1-21-00017-Hum	24	Aug 22 2022	T. Wills-Pendley			No	Functional	
402001	1-21-00017-Hum	25	Oct 13 2021	N. Ludington	Aug 22 2022	T. Wills-Pendley	No	Functional	
402001	1-21-00017-Hum	26	Oct 13 2021	N. Ludington	Aug 22 2022	T. Wills-Pendley	No	Functional	
402001	1-21-00017-Hum	28	Dec 14 2021	T. Wills-Pendley	Aug 22 2022	T. Wills-Pendley	No	Functional	
402001	1-21-00017-Hum	29	Dec 14 2021	T. Wills-Pendley	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	32	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	33	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	34	Oct 13 2021	N. Ludington	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	35	Oct 13 2021	N. Ludington	Aug 22 2022	T. Wills-Pendley	No	Functional	
402001	1-21-00017-Hum	36	Oct 6 2021	H. Weaver	Jul 21 2022	Others	No	Functional	
402001	1-21-00017-Hum	E	Oct 13 2021	N. Ludington			No	Functional	
421801	1-18-00194-HUM	07	Oct 2 2020	M. Lewis	Aug 30 2021	M. Lewis	No	Functional	
422001	1-20-00067 Hum	1	Oct 7 2022	H. Weaver			No	Functional	
422001	1-20-00067 Hum	2	Oct 7 2022	H. Weaver			No	Functional	
422001	1-20-00067 Hum	5	Oct 13 2020	M. Lewis	Aug 17 2021	M. Lewis	No	Functional	
422001	1-20-00067 Hum	6	Oct 2 2020	M. Lewis	Aug 17 2021	M. Lewis	No	Functional	
422002	1-21-00091-Hum	09	Oct 7 2022	H. Weaver			No	Functional	

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422002	1-21-00091-Hum	10	Oct 7 2022	H. Weaver			No	Functional	
422002	1-21-00091-Hum	11	Oct 7 2022	H. Weaver			No	Functional	
422002	1-21-00091-Hum	12	Oct 7 2022	H. Weaver			No	Functional	
422002	1-21-00091-Hum	13	Oct 7 2022	H. Weaver			No	Functional	
422002	1-21-00091-Hum	14	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	15	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	16	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	17	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	19	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	20	Sep 12 2022	Others			No	Functional	
422002	1-21-00091-Hum	WQ.1	Oct 7 2022	H. Weaver			No	Functional	
431701	1-17-089H	02	Jan 3 2022	M. Lewis	Jul 14 2022	Others	No	Functional	
431801	1-18-00145-HUM	02	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431801	1-18-00145-HUM	03	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431801	1-18-00145-HUM	04	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431801	1-18-00145-HUM	05	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431901	1-19-00167-HUM	01	Oct 20 2020	M. Lewis	Sep 27 2021	H. Weaver	No	Functional	
431901	1-19-00167-HUM	02	Oct 20 2020	M. Lewis	Sep 27 2021	H. Weaver	No	Functional	
431901	1-19-00167-HUM	07	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431901	1-19-00167-HUM	08	Oct 2 2020	N. Ludington	Jul 18 2022	Others	No	Functional	
431901	1-19-00167-HUM	09	Oct 2 2020	N. Ludington	Jul 18 2022	Others	No	Functional	
431901	1-19-00167-HUM	10	Oct 2 2020	N. Ludington	Aug 24 2021	M. Lewis	No	Functional	
431901	1-19-00167-HUM	11	Oct 2 2020	N. Ludington	Jul 1 2021	Others	No	Functional	
431901	1-19-00167-HUM	12	Oct 2 2020	N. Ludington	Jul 1 2021	Others	No	Functional	
431901	1-19-00167-HUM	13	Oct 2 2020	N. Ludington	Jul 1 2021	Others	No	Functional	
431901	1-19-00167-HUM	14	Oct 2 2020	N. Ludington	Jul 1 2021	Others	No	Functional	
431901	1-19-00167-HUM	17	Aug 24 2021	M. Lewis	Jul 6 2022	N. Ludington	No	Functional	
441802	1-19-00068-HUM	01	Oct 8 2020	M. Lewis	Jun 30 2021	Others	No	Functional	
441802	1-19-00068-HUM	04	Oct 2 2020	M. Lewis	Jun 30 2021	Others	No	Functional	
471307	1-14-002H	04	Dec 12 2022	L. Judevine			No	Functional	
471702	1-17-060H	05	Nov 1 2021	H. Weaver	Jul 19 2022	Others	No	Functional	
471702	1-17-060H	10	Dec 27 2021	N. Ludington	Jul 19 2022	Others	No	Functional	
471802	1-18-00140 HUM	04	Sep 27 2022	Others			No	Functional	
471802	1-18-00140 HUM	05	Sep 27 2022	Others			No	Functional	
471802	1-18-00140 HUM	06	Sep 27 2022	Others			No	Functional	
471903	1-19-00208HUM	1	Dec 27 2021	N. Ludington	Jul 19 2022	Others	No	Functional	
471904	1-19-00209HUM	06	Nov 1 2021	H. Weaver	Jul 20 2022	Others	No	Functional	
471904	1-19-00209HUM	08	Oct 27 2020	M. Lewis	Aug 26 2021	M. Lewis	No	Functional	

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471904	1-19-00209HUM	09	Oct 27 2020	M. Lewis	Aug 26 2021	M. Lewis	No	Functional	
471904	1-19-00209HUM	10	Oct 27 2020	M. Lewis	Aug 26 2021	M. Lewis	No	Functional	
471904	1-19-00209HUM	11	Oct 5 2020	N. Ludington	Aug 26 2021	M. Lewis	No	Functional	
471905	1-20-00046 Hum	01	Dec 16 2021	H. Weaver	Jul 18 2022	Others	No	Functional	
472004	1-21-00099-Hum	01	Dec 13 2022	L. Judevine			No	Functional	
472004	1-21-00099-Hum	08	Sep 27 2022	Others			No	Functional	
472004	1-21-00099-Hum	10	Oct 19 2022	Others			No	Functional	
472101	1-21-00147-Hum	1	Jul 28 2022	Others			No	Functional	
472101	1-21-00147-Hum	1.5	Jul 28 2022	Others			No	Functional	
472101	1-21-00147-Hum	2	Jul 28 2022	Others			No	Functional	
472101	1-21-00147-Hum	4	Sep 27 2022	Others			No	Functional	
472104	1-21-00120-Hum	08	Sep 27 2022	Others			No	Functional	
481501	1-15-143H	03	Oct 15 2021	M. Lewis	Jul 20 2022	Others	No	Functional	
481501	1-15-143H	07	Nov 16 2021	E. Haffner			No	Functional	
481501	1-15-143H	08	Nov 16 2021	E. Haffner			No	Functional	
481501	1-15-143H	09	Nov 16 2021	E. Haffner			No	Functional	
481501	1-15-143H	13	Sep 30 2021	N. Ludington			No	Functional	
481501	1-15-143H	19	Nov 16 2021	H. Weaver			No	Functional	
481503	1-16-125H	08	Jan 3 2022	M. Lewis	Sep 23 2022	H. Weaver	No	Functional	
481503	1-16-125H	11	Nov 16 2021	H. Weaver	Sep 23 2022	H. Weaver	No	Functional	
481503	1-16-125H	13	Nov 16 2021	H. Weaver	Sep 23 2022	H. Weaver	No	Functional	
481702	1-17-149HUM	10	Jan 4 2022	T. Wills-Pendley	Oct 11 2022	H. Weaver	No	Functional	
481702	1-17-149HUM	11	Jan 4 2022	T. Wills-Pendley	Oct 11 2022	H. Weaver	No	Functional	
481901	1-20-00026 Hum	01	Oct 6 2020	M. Lewis	Aug 30 2021	M. Lewis	No	Functional	
481901	1-20-00026 Hum	02	Oct 6 2020	M. Lewis	Aug 30 2021	M. Lewis	No	Functional	
481901	1-20-00026 Hum	06	Oct 7 2020	M. Lewis	Aug 17 2021	M. Lewis	No	Functional	
481901	1-20-00026 Hum	08	Oct 6 2020	M. Lewis	Jul 13 2021	Others	No	Functional	
482101	1-22-00013-Hum	01	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	02	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	03	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	04	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	07	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	11	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	12	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	13	Oct 11 2022	H. Weaver			No	Functional	
482101	1-22-00013-Hum	19	Dec 2 2022	Others			No	Functional	
482101	1-22-00013-Hum	20	Dec 2 2022	Others			No	Functional	
482101	1-22-00013-Hum	21	Dec 2 2022	Others			No	Functional	

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482101	1-22-00013-Hum	22	Dec 2 2022	Others			No	Functional	
482101	1-22-00013-Hum	24	Dec 2 2022	Others			No	Functional	
482102	1-22-00018-Hum	2	Sep 9 2022	L. Judevine			No	Functional	
511506	1-16-041H	08	Oct 21 2020	N. Ludington	Oct 14 2021	M. Lewis	No	Functional	
511704	1-17-136HUM	01	Nov 3 2021	H. Weaver	Aug 17 2022	Others	No	Functional	
511704	1-17-136HUM	06	Nov 3 2021	H. Weaver	Aug 17 2022	Others	No	Functional	
511705	1-18-016H	05	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	06	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	07	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	Yes	Functional	Scarp on left bank has buried inlet. Stream overtops road and is eroding obf. 5-10cyd delivery. 10' road width
511705	1-18-016H	08	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	09	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	11	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	12	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	13	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	14	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	15	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511705	1-18-016H	16	Oct 23 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511706	1-17-143HUM	07	Oct 15 2021	N. Ludington	Sep 19 2022		No	Functional	
511706	1-17-143HUM	10	Oct 15 2021	N. Ludington	Aug 26 2022	Others	No	Functional	
511706	1-17-143HUM	12	Oct 15 2021	N. Ludington	Aug 26 2022	Others	No	Functional	
511706	1-17-143HUM	15	Jan 28 2022	T. Wills-Pendley	Aug 26 2022	Others	No	Functional	
511801	1-18-092 HUM	01	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	02	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	03	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	04	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	05	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	06	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	07	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	08	Sep 19 2022	Others			No	Functional	
511801	1-18-092 HUM	09	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	10	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	11	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	12	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	13	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	14	Sep 15 2022	Others			No	Functional	
511801	1-18-092 HUM	17	Sep 15 2022	Others			No	Functional	
511801	1-18-092 HUM	18	Sep 15 2022	Others			No	Functional	

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511801	1-18-092 HUM	19	Oct 3 2022	Others			No	Functional	
511801	1-18-092 HUM	20	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	21	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	22	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	23	Sep 8 2022	H. Weaver			No	Functional	
511801	1-18-092 HUM	24	Sep 8 2022	H. Weaver			No	Functional	
511802	1-18-00166-HUM	01	Oct 30 2020	N. Ludington	Jul 6 2021	M. Lewis	No	Functional	
511802	1-18-00166-HUM	06	Oct 2 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	
511802	1-18-00166-HUM	08	Oct 2 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	
511802	1-18-00166-HUM	10	Oct 2 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	
511802	1-18-00166-HUM	13	Oct 2 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	
511802	1-18-00166-HUM	19	Oct 2 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	01	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	02	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	03	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	04	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	05	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	06	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	07	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	08	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	09	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	10	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	11	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	12	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	19	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	20	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511803	1-18-178HUM	21	Oct 19 2020	M. Lewis	Jun 29 2021	M. Lewis	No	Functional	
511804	1-18-00190-HUM	07	Oct 20 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511804	1-18-00190-HUM	09	Sep 28 2020	N. Ludington	Jul 1 2021	M. Lewis	No	Functional	
511804	1-18-00190-HUM	10	Oct 20 2020	M. Lewis	Jul 1 2021	M. Lewis	No	Functional	
511804	1-18-00190-HUM	11	Sep 28 2020	N. Ludington	Jul 1 2021	M. Lewis	No	Functional	
511804	1-18-00190-HUM	12	Sep 28 2020	N. Ludington	Jul 1 2021	M. Lewis	No	Functional	
512001	1-20-00085 Hum	1	Oct 21 2020	N. Ludington	Jul 6 2021	M. Lewis	No	Functional	
512001	1-20-00085 Hum	2	Oct 21 2020	N. Ludington	Jul 6 2021	M. Lewis	No	Functional	
512001	1-20-00085 Hum	3	Oct 21 2020	N. Ludington	Jul 6 2021	M. Lewis	No	Functional	
512001	1-20-00085 Hum	5	Oct 21 2020	N. Ludington	Jul 6 2021	M. Lewis	No	Functional	
512001	1-20-00085 Hum	8	Nov 8 2021	T. Wills-Pendley	Aug 17 2022	Others	No	Functional	
512102	1-22-00026-Hum	14	Sep 16 2022	Others			No	Functional	

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561403	1-15-082H	C	Oct 27 2021	H. Weaver			No	Functional	
561603	1-16-120HUM	01.2	Nov 2 2020	M. Lewis	Jun 28 2021	M. Lewis	No	Functional	
561611	1-17-057 HUM	109	Oct 27 2021	H. Weaver	Sep 1 2022	Others	No	Functional	
561703	1-17-147HUM	05	Sep 14 2021	M. Lewis	Aug 18 2022	Others	No	Functional	
561703	1-17-147HUM	06	Sep 14 2021	M. Lewis	Aug 18 2022	Others	No	Functional	
561703	1-17-147HUM	07	Sep 14 2021	M. Lewis	Aug 29 2022	Others	No	Functional	
561704	1-18-063HUM	02	Sep 13 2021	M. Lewis			No	Functional	
561704	1-18-063HUM	03	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561704	1-18-063HUM	04	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561704	1-18-063HUM	05	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561704	1-18-063HUM	06	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561704	1-18-063HUM	07	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561704	1-18-063HUM	08	Sep 13 2021	M. Lewis	Aug 31 2022	Others	No	Functional	
561802	1-19-00002-HUM	01	Sep 23 2020	M. Cameron	Sep 15 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	03	Sep 23 2020	M. Cameron	Sep 15 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	05	Jan 5 2022	T. Wills-Pendley	Aug 26 2022	Others	No	Functional	
561802	1-19-00002-HUM	06	Nov 2 2020	M. Lewis	Jun 28 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	07	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	08	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	09	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	10	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561802	1-19-00002-HUM	14	Jan 5 2022	T. Wills-Pendley	Jun 29 2021	M. Lewis	No	Functional	
561803	1-18-00141HUM	02	Sep 16 2022	Others			No	Functional	
561803	1-18-00141HUM	03	Sep 16 2022	Others			No	Functional	
561803	1-18-00141HUM	05	Sep 28 2020	N. Ludington	Jun 29 2021	M. Lewis	No	Functional	
561803	1-18-00141HUM	08	Sep 28 2020	N. Ludington	Jun 29 2021	M. Lewis	No	Functional	
561803	1-18-00141HUM	09	Sep 28 2020	N. Ludington	Jun 29 2021	M. Lewis	No	Functional	
561803	1-18-00141HUM	10	Sep 28 2020	N. Ludington	Jun 29 2021	M. Lewis	No	Functional	
561804	1-18-00173-HUM	08	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561804	1-18-00173-HUM	09	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561804	1-18-00173-HUM	10	Sep 23 2020	M. Cameron	Jun 28 2021	M. Lewis	No	Functional	
561804	1-18-00173-HUM	11	Jan 6 2022	T. Wills-Pendley	Aug 18 2022	Others	No	Functional	
561804	1-18-00173-HUM	12	Jan 6 2022	T. Wills-Pendley	Aug 18 2022	Others	No	Functional	
561804	1-18-00173-HUM	16	Nov 24 2021	E. Haffner	Aug 18 2022	Others	No	Functional	
561804	1-18-00173-HUM	17	Jan 6 2022	T. Wills-Pendley	Aug 18 2022	Others	No	Functional	
561805	1-19-00040-HUM	02	Nov 12 2021	H. Weaver	Aug 29 2022	Others	No	Functional	
561805	1-19-00040-HUM	03	Nov 12 2021	H. Weaver	Aug 29 2022	Others	No	Functional	
561805	1-19-00040-HUM	05	Jan 3 2022	H. Weaver	Jul 20 2022	Others	No	Functional	

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561805	1-19-00040-HUM	06	Jan 3 2022	H. Weaver	Jul 20 2022	Others	No	Functional	
561805	1-19-00040-HUM	07	Jan 3 2022	H. Weaver	Jul 20 2022	Others	No	Functional	
561805	1-19-00040-HUM	08	Oct 27 2021	H. Weaver	Sep 2 2022	Others	No	Functional	
561805	1-19-00040-HUM	11	Oct 27 2021	H. Weaver	Sep 2 2022	Others	No	Functional	
561806	1-19-00094HUM	01	Nov 2 2020	M. Lewis	Jul 21 2021	M. Lewis	No	Functional	Crossing wasnt excavated to grade. winter flows have revealed a humboldt log below the top with channel incision occuring to the log depth ~ 2-3'. no more than a potential of 10cyd will deliver due to sloughing stream banks. sediment wedge of gravels has formed. No erosion around inlet or outlet.
561806	1-19-00094HUM	04	Aug 11 2021	N. Ludington	Sep 1 2022	Others	No	Functional	
561806	1-19-00094HUM	05	Sep 15 2021	M. Lewis	Sep 1 2022	Others	No	Functional	
561806	1-19-00094HUM	06	Sep 15 2021	M. Lewis	Sep 1 2022	Others	No	Functional	
561806	1-19-00094HUM	10	Nov 23 2021	E. Haffner	Sep 2 2022	Others	No	Functional	
561806	1-19-00094HUM	11	Sep 15 2021	M. Lewis	Sep 2 2022	Others	No	Functional	
561806	1-19-00094HUM	13	Sep 15 2021	M. Lewis	Sep 2 2022	Others	No	Functional	
561806	1-19-00094HUM	15	Jul 21 2021	M. Lewis	Sep 27 2022	Others	No	Functional	
561806	1-19-00094HUM	16	Oct 27 2021	H. Weaver	Sep 1 2022	Others	No	Functional	
561806	1-19-00094HUM	17	Oct 27 2021	H. Weaver	Sep 1 2022	Others	No	Functional	
561901	1-19-00156HUM	01	Nov 2 2020	M. Lewis	Jul 21 2021	M. Lewis	No	Functional	
561901	1-19-00156HUM	02	Nov 2 2020	M. Lewis	Jul 21 2021	M. Lewis	No	Functional	
561901	1-19-00156HUM	03	Nov 2 2020	M. Lewis	Jul 21 2021	M. Lewis	No	Functional	
561902	1-20-00021HUM	09	Sep 14 2021	M. Lewis	Sep 2 2022	Others	No	Functional	
561902	1-20-00021HUM	10	Sep 14 2021	M. Lewis	Sep 2 2022	Others	No	Functional	
561902	1-20-00021HUM	12	Nov 24 2021	E. Haffner	Sep 2 2022	Others	No	Functional	
561902	1-20-00021HUM	13	Nov 24 2021	E. Haffner	Sep 2 2022	Others	No	Functional	
561903	1-21-00001-Hum	08	Sep 13 2021	M. Lewis	Sep 16 2022	Others	No	Functional	
561904	1-20-00149-HUM	03	Sep 14 2021	M. Lewis	Sep 1 2022	Others	No	Functional	
561904	1-20-00149-HUM	04	Sep 15 2021	M. Lewis	Sep 1 2022	Others	No	Functional	
561904	1-20-00149-HUM	05	Aug 11 2021	N. Ludington	Sep 1 2022	Others	No	Functional	
561904	1-20-00149-HUM	12	Jan 3 2022	M. Lewis	Aug 29 2022	Others	No	Functional	
561904	1-20-00149-HUM	13	Jan 3 2022	M. Lewis	Aug 29 2022	Others	No	Functional	
562001	1-21-00023-Hum	02	Nov 12 2021	N. Ludington	Jul 19 2022	N. Ludington	No	Functional	
562001	1-21-00023-Hum	06	Nov 12 2021	N. Ludington	Oct 18 2022	H. Weaver	No	Functional	
562001	1-21-00023-Hum	07	Nov 2 2021	H. Weaver	Oct 18 2022	H. Weaver	No	Functional	
562001	1-21-00023-Hum	08	Nov 2 2021	H. Weaver	Sep 26 2022	Others	No	Functional	
562001	1-21-00023-Hum	12	Sep 27 2022	Others			No	Functional	
562001	1-21-00023-Hum	13	Oct 18 2022	H. Weaver			No	Functional	

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562001	1-21-00023-Hum	16	Nov 12 2021	E. Haffner	Jul 20 2022	Others	No	Functional	
562002	1-20-00213-Hum	01	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	02	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	03	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	04	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	05	Sep 29 2022	Others			No	Functional	
562002	1-20-00213-Hum	06	Sep 16 2022	Others			No	Functional	
562002	1-20-00213-Hum	08	Sep 13 2021	M. Lewis	Jul 8 2022	T. Wills-Pendley	No	Functional	
562002	1-20-00213-Hum	09	Sep 13 2021	M. Lewis	Jul 8 2022	T. Wills-Pendley	No	Functional	
562002	1-20-00213-Hum	10	Sep 13 2021	M. Lewis	Jul 8 2022	T. Wills-Pendley	No	Functional	
562002	1-20-00213-Hum	12	Sep 13 2021	M. Lewis	Jul 8 2022	T. Wills-Pendley	No	Functional	
562002	1-20-00213-Hum	13	Sep 13 2021	M. Lewis	Jul 8 2022	T. Wills-Pendley	No	Functional	
562002	1-20-00213-Hum	14	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	15	Sep 15 2022	Others			No	Functional	
562002	1-20-00213-Hum	16	Sep 15 2022	Others			No	Functional	
611701	1-17-079HUM-DEL	07	Nov 2 2021	H. Weaver			No	Functional	
611901	1-20-00177-Hum	01	Sep 20 2021	M. Lewis	Sep 23 2022	Others	No	Functional	
611901	1-20-00177-Hum	03	Sep 20 2021	M. Lewis	Sep 27 2022	Others	No	Functional	
611901	1-20-00177-Hum	06	Sep 16 2021	M. Lewis	Sep 27 2022	Others	No	Functional	Decom fill xing with geo features adjacent. The left stream bank is near vertical and does not match upstream or downstream natural stream banks.
611901	1-20-00177-Hum	07	Nov 2 2021	H. Weaver	Sep 27 2022	Others	No	Functional	
611901	1-20-00177-Hum	09	Jan 3 2022	H. Weaver	Aug 1 2022	Others	No	Functional	
611901	1-20-00177-Hum	10	Sep 26 2022	Others			No	Functional	
611901	1-20-00177-Hum	CSDS 1	Sep 26 2022	Others			No	Functional	
661802	1-18-191-DEL	04	Nov 2 2021	H. Weaver	Sep 23 2022	Others	No	Functional	
661802	1-18-191-DEL	05	Nov 2 2021	H. Weaver	Sep 23 2022	Others	No	Functional	
661802	1-18-191-DEL	07	Nov 2 2021	H. Weaver	Sep 23 2022	Others	No	Functional	
661802	1-18-191-DEL	09	Nov 2 2021	H. Weaver	Sep 23 2022	Others	No	Functional	
661901	1-19-00142-DEL	1	Dec 28 2021	M. Lewis	Sep 28 2022	Others	No	Functional	
661901	1-19-00142-DEL	2	Dec 28 2021	M. Lewis	Sep 28 2022	Others	No	Functional	
661901	1-19-00142-DEL	3	Nov 10 2021	H. Weaver	Nov 15 2022	Others	No	Functional	
661901	1-19-00142-DEL	4	Nov 10 2021	H. Weaver	Sep 28 2022	Others	No	Functional	
661901	1-19-00142-DEL	5	Sep 29 2021	E. Haffner	Sep 28 2022	Others	No	Functional	
662002	1-20-00210-DEL	01	Dec 27 2021	M. Lewis	Sep 23 2022	Others	No	Functional	
672001	1-21-00089-Hum	RP-01	Dec 1 2022	Others			No	Functional	
672001	1-21-00089-Hum	RP-18	Sep 29 2022	Others			No	Functional	
672001	1-21-00089-Hum	RP-19	Sep 29 2022	Others			No	Functional	

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702001	1-21-00005-Del	01	Nov 9 2021	M. Lewis	Sep 15 2022	Others	No	Functional	
702001	1-21-00005-Del	02	Nov 9 2021	M. Lewis	Sep 15 2022	Others	No	Functional	
702001	1-21-00005-Del	03	Nov 9 2021	M. Lewis	Sep 15 2022	Others	No	Functional	
702001	1-21-00005-Del	04	Nov 9 2021	M. Lewis	Sep 22 2022	L. Judevine	No	Functional	
702001	1-21-00005-Del	07	Nov 9 2021	M. Lewis	Sep 22 2022	L. Judevine	No	Functional	
702001	1-21-00005-Del	08	Nov 9 2021	M. Lewis	Sep 22 2022	L. Judevine	No	Functional	
702001	1-21-00005-Del	15	Nov 9 2021	M. Lewis	Sep 22 2022	L. Judevine	No	Functional	
702001	1-21-00005-Del	16	Nov 9 2021	M. Lewis	Sep 22 2022	L. Judevine	No	Functional	
711702	1-17-073	07	Dec 13 2021	T. Wills-Pendley	Sep 19 2022	H. Weaver	No	Functional	
711702	1-17-073	08	Dec 13 2021	T. Wills-Pendley			No	Functional	
711702	1-17-073	10	Dec 13 2021	T. Wills-Pendley	Sep 19 2022	H. Weaver	No	Functional	
711702	1-17-073	18	Dec 7 2022	H. Weaver			No	Functional	
711801	1-18-098 DEL	01	Dec 1 2022	Others			No	Functional	
711804	1-19-00120DEL	01	Dec 1 2022	Others			No	Functional	
711804	1-19-00120DEL	02	Dec 1 2022	Others			No	Functional	
711804	1-19-00120DEL	04	Dec 13 2021	T. Wills-Pendley	Sep 23 2022	Others	No	Functional	
711804	1-19-00120DEL	05	Dec 13 2021	T. Wills-Pendley	Sep 23 2022	Others	No	Functional	
711804	1-19-00120DEL	12	Dec 13 2021	T. Wills-Pendley	Sep 23 2022	Others	No	Functional	
711804	1-19-00120DEL	13	Dec 13 2021	T. Wills-Pendley	Sep 23 2022	Others	No	Functional	
711804	1-19-00120DEL	14	Dec 1 2022	Others			No	Functional	
711804	1-19-00120DEL	17	Dec 1 2022	Others			No	Functional	
711901	1-20-00080 Del	07	Nov 16 2021	T. Wills-Pendley	Sep 19 2022	H. Weaver	No	Functional	
711901	1-20-00080 Del	08	Nov 16 2021	T. Wills-Pendley	Sep 19 2022	H. Weaver	No	Functional	
711901	1-20-00080 Del	09	Nov 16 2021	T. Wills-Pendley	Sep 19 2022	H. Weaver	No	Functional	
711901	1-20-00080 Del	10	Nov 16 2021	T. Wills-Pendley			No	Functional	
711902	1-20-00007DEL	02	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	03	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	04	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	05	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	09	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	13	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	17	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	18	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	24	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	26	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	27	Sep 25 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	29	Oct 5 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	
711902	1-20-00007DEL	30	Oct 5 2020	M. Cameron	Jul 14 2021	M. Lewis	No	Functional	

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711903	1-19-00220DEL	01	Nov 3 2020	M. Lewis	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	02	Nov 3 2020	M. Lewis	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	04	Nov 3 2020	M. Lewis	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	05	Nov 17 2021	T. Wills-Pendley	Sep 27 2022	Others	No	Functional	
711903	1-19-00220DEL	06	Nov 17 2021	T. Wills-Pendley	Sep 23 2022	Others	No	Functional	
711903	1-19-00220DEL	08	Sep 28 2020	M. Cameron	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	09	Sep 28 2020	M. Cameron	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	10	Sep 28 2020	M. Cameron	Sep 16 2021	M. Lewis	No	Functional	
711903	1-19-00220DEL	11	Sep 28 2020	M. Cameron	Sep 16 2021	M. Lewis	No	Functional	
712103	1-21-00189-Del	02	Nov 30 2022	Others			No	Functional	
712103	1-21-00189-Del	03	Nov 30 2022	Others			No	Functional	
712103	1-21-00189-Del	06	Nov 30 2022	Others			No	Functional	
712103	1-21-00189-Del	07	Nov 30 2022	Others			No	Functional	
712103	1-21-00189-Del	101	Nov 30 2022	Others			No	Functional	
712103	1-21-00189-Del	102	Dec 1 2022	Others			No	Functional	
712103	1-21-00189-Del	103	Dec 1 2022	Others			No	Functional	
712103	1-21-00189-Del	104	Dec 1 2022	Others			No	Functional	
731602	1-17-062 DEL	01	Sep 29 2020	M. Cameron	Sep 10 2021	M. Lewis	No	Functional	
731802	1-19-00097-DEL	1	Sep 29 2020	M. Cameron	Aug 20 2021	M. Lewis	No	Functional	
731802	1-19-00097-DEL	2	Sep 29 2020	M. Cameron	Aug 20 2021	M. Lewis	No	Functional	
731901	1-19-00221DEL	04	Nov 3 2020	M. Lewis	Nov 2 2021	T. Wills-Pendley	No	Functional	
732002	1-21-00002-Del	01	Nov 2 2021	T. Wills-Pendley	Sep 20 2022	Others	No	Functional	
732002	1-21-00002-Del	02	Nov 2 2021	T. Wills-Pendley	Sep 20 2022	Others	No	Functional	
732002	1-21-00002-Del	03	Nov 16 2021	T. Wills-Pendley	Sep 20 2022	Others	No	Functional	
732002	1-21-00002-Del	07	Jan 5 2022	H. Weaver	Sep 20 2022	Others	No	Functional	
732102	1-21-00195-Del	02	Dec 1 2022	Others			No	Functional	
732102	1-21-00195-Del	04	Dec 1 2022	Others			No	Functional	
732102	1-21-00195-Del	100	Dec 1 2022	Others			No	Functional	
732102	1-21-00195-Del	101	Dec 1 2022	Others			No	Functional	
732102	1-21-00195-Del	102	Dec 1 2022	Others			No	Functional	
851602	1-18-007DEL	02	Dec 13 2021	M. Lewis	Jun 16 2021	N. Ludington	No	Functional	
851602	1-18-007DEL	03	Nov 15 2021	H. Weaver	Sep 9 2022	Others	No	Functional	
851602	1-18-007DEL	3.1	Nov 15 2021	H. Weaver	Sep 9 2022	Others	No	Functional	
851602	1-18-007DEL	10	Sep 15 2021	M. Lewis	Sep 9 2022	Others	No	Functional	
851602	1-18-007DEL	105	Sep 10 2021	M. Lewis			No	Functional	
851801	1-18-177-DEL	01	Jul 7 2020	M. Lewis	Nov 15 2021	H. Weaver	No	Functional	
851801	1-18-177-DEL	03	Jul 9 2021	L. Judevine	Jul 21 2022	Others	No	Functional	
851801	1-18-177-DEL	04	Jul 9 2021	L. Judevine	Sep 9 2022	Others	No	Functional	

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851801	1-18-177-DEL	CSDS-01	Jul 9 2021	L. Judevine	Jul 21 2022	Others	No	Functional	
851801	1-18-177-DEL	CSDS-03	Jul 9 2021	L. Judevine	Jul 21 2022	Others	No	Functional	
851802	1-20-00103-Hum	1	Oct 5 2021	E. Haffner	Sep 22 2022	Others	No	Functional	
851802	1-20-00103-Hum	3	Nov 2 2021	T. Wills-Pendley	Sep 22 2022	Others	No	Functional	
851803	1-20-00013 Del	15	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	16	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	17	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	18	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	19	Sep 28 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	20	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	22	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	23	Sep 29 2020	M. Cameron	Jul 8 2021	M. Lewis	No	Functional	
851803	1-20-00013 Del	24	Sep 29 2020	M. Cameron	Jul 6 2021	M. Lewis	No	Functional	Critical dip does not extend to IBD.
851901	1-20-00008 Del	07	Nov 4 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	12	Sep 10 2021	M. Lewis	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	13	Sep 10 2021	M. Lewis	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	14	Sep 10 2021	M. Lewis	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	15	Nov 4 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	16	Nov 4 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	17	Nov 4 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
851901	1-20-00008 Del	18	Nov 4 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	01	Dec 3 2021	T. Wills-Pendley	Sep 20 2022	Others	No	Functional	
852001	1-21-00004-Del	07	Sep 10 2021	M. Lewis	Sep 9 2022	Others	No	Functional	
852001	1-21-00004-Del	08	Sep 10 2021	M. Lewis	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	09	Sep 10 2021	M. Lewis	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	10	Sep 10 2021	M. Lewis	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	11	Sep 10 2021	M. Lewis	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	13.1	Nov 15 2021	H. Weaver	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	14	Nov 15 2021	H. Weaver	Sep 9 2022	Others	No	Functional	
852001	1-21-00004-Del	15	Nov 15 2021	H. Weaver	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	16	Nov 15 2021	H. Weaver	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	18	Nov 15 2021	H. Weaver	Aug 10 2022	T. Wills-Pendley	No	Functional	
852001	1-21-00004-Del	19	Dec 13 2021	M. Lewis	Aug 10 2022	T. Wills-Pendley	No	Functional	
852002	1-21-00146-Del	01	Sep 20 2022	Others			No	Functional	
852002	1-21-00146-Del	02	Nov 30 2022	Others			No	Functional	
852002	1-21-00146-Del	03	Dec 1 2022	Others			No	Functional	
852002	1-21-00146-Del	06	Nov 30 2022	Others			No	Functional	
852002	1-21-00146-Del	07	Sep 22 2022	Others			No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
852002	1-21-00146-Del	08	Nov 18 2021	H. Weaver			No	Functional	
852002	1-21-00146-Del	09	Sep 9 2022	Others			No	Functional	
852002	1-21-00146-Del	10	Sep 20 2022	Others			No	Functional	
872103	1-21EM-00198 DEL	01	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	02	Nov 23 2021	T. Wills-Pendley			No	Functional	
872103	1-21EM-00198 DEL	03	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	04	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	05	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	06	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	07	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
872103	1-21EM-00198 DEL	09	Nov 23 2021	T. Wills-Pendley	Sep 26 2022	Others	No	Functional	
901701	1-17-131DEL	02	Nov 2 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
901901	1-19-00212DEL	1	Sep 20 2022	H. Weaver			No	Functional	
901901	1-19-00212DEL	2	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
901901	1-19-00212DEL	5	Sep 20 2022	H. Weaver			No	Functional	
902101	1-21-00102-Del	2	Sep 20 2022	H. Weaver			No	Functional	
902101	1-21-00102-Del	3	Sep 20 2022	H. Weaver			No	Functional	
902101	1-21-00102-Del	4	Sep 20 2022	H. Weaver			No	Functional	
931602	1-16-115DEL	4	Dec 30 2020	N. Ludington	Sep 23 2021	E. Haffner	No	Functional	
931702	1-18-106 DEL	09	Dec 1 2022	Others			No	Functional	
931703	1-18-044DEL	16	Sep 23 2021	H. Weaver	Sep 27 2022	H. Weaver	No	Functional	
931703	1-18-044DEL	23	Oct 28 2020	M. Cameron	Sep 30 2021	H. Weaver	No	Functional	
931703	1-18-044DEL	42	Oct 28 2020	M. Cameron	Sep 30 2021	H. Weaver	No	Functional	
931703	1-18-044DEL	43	Oct 18 2021	H. Weaver	Sep 27 2022	H. Weaver	No	Functional	
931801	1-18-00195-DEL	16	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931801	1-18-00195-DEL	16.1	Oct 19 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931802	1-18-00187-DEL	02	Oct 30 2020	M. Cameron	Sep 22 2021	H. Weaver	No	Functional	
931802	1-18-00187-DEL	03	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931802	1-18-00187-DEL	08	Oct 20 2022	H. Weaver			No	Functional	
931803	1-19-00100-DEL	01	Oct 27 2020	M. Cameron	Sep 22 2021	H. Weaver	No	Functional	
931803	1-19-00100-DEL	05	Oct 27 2020	M. Cameron	Sep 22 2021	H. Weaver	No	Functional	
931803	1-19-00100-DEL	10	Dec 30 2020	N. Ludington	Oct 1 2021	H. Weaver	No	Functional	
931803	1-19-00100-DEL	14	Dec 29 2021	T. Wills-Pendley	Sep 27 2022	H. Weaver	No	Functional	
931803	1-19-00100-DEL	15	Nov 2 2020	M. Cameron	Sep 27 2022	H. Weaver	No	Functional	
931803	1-19-00100-DEL	16	Nov 2 2020	M. Cameron	Sep 30 2021	H. Weaver	No	Functional	
931902	1-19-00158DEL	01	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	02	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	02.1	Dec 30 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
931902	1-19-00158DEL	03	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	04	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	05	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	06	Dec 29 2021	H. Weaver	Sep 16 2022	L. Judevine	No	Functional	
931902	1-19-00158DEL	09	Oct 30 2020	M. Cameron	Oct 19 2021	H. Weaver	No	Functional	
931902	1-19-00158DEL	10	Oct 30 2020	M. Cameron	Oct 1 2021	H. Weaver	No	Functional	
931902	1-19-00158DEL	11	Oct 30 2020	M. Cameron	Oct 1 2021	H. Weaver	No	Functional	
931902	1-19-00158DEL	12	Oct 30 2020	M. Cameron	Oct 1 2021	H. Weaver	No	Functional	
931902	1-19-00158DEL	14	Oct 6 2021	E. Haffner	Sep 16 2022	L. Judevine	No	Functional	
931903	1-19-00199DEL	01	Dec 30 2021	H. Weaver	Sep 7 2022	T. Wills-Pendley	No	Functional	
931903	1-19-00199DEL	06	Dec 30 2021	H. Weaver	Sep 7 2022	T. Wills-Pendley	No	Functional	
931903	1-19-00199DEL	07	Oct 15 2021	H. Weaver	Sep 7 2022	T. Wills-Pendley	No	Functional	
932001	1-20-00142-Del	1	Sep 22 2021	H. Weaver	Sep 7 2022	T. Wills-Pendley	No	Functional	
932001	1-20-00142-Del	2	Nov 24 2021	T. Wills-Pendley	Sep 7 2022	T. Wills-Pendley	No	Functional	
932102	1-21-00165-Del	05	Dec 6 2022	H. Weaver			No	Functional	
932102	1-21-00165-Del	08	Dec 5 2022	Others			No	Functional	
932102	1-21-00165-Del	09	Dec 5 2022	Others			No	Functional	
932102	1-21-00165-Del	10	Dec 6 2022	H. Weaver			No	Functional	
932102	1-21-00165-Del	11	Dec 6 2022	H. Weaver			No	Functional	
932102	1-21-00165-Del	12	Dec 1 2022	Others			No	Functional	
932102	1-21-00165-Del	13	Dec 1 2022	Others			No	Functional	
932102	1-21-00165-Del	14	Dec 1 2022	Others			No	Functional	
932102	1-21-00165-Del	17	Dec 1 2022	Others			No	Functional	
932102	1-21-00165-Del	18	Dec 1 2022	Others			No	Functional	
932102	1-21-00165-Del	19	Dec 1 2022	Others			No	Functional	
941502	1-16-006 DEL	34	Nov 11 2020	M. Cameron	Oct 19 2021	T. Wills-Pendley	No	Functional	
941702	1-18-071-DEL	04	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
941702	1-18-071-DEL	06	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
941702	1-18-071-DEL	07	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
941702	1-18-071-DEL	08	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
941702	1-18-071-DEL	09	Nov 4 2020	M. Cameron	Oct 13 2021	H. Weaver	No	Functional	
941801	1-18-00158-DEL	06	Nov 11 2020	M. Cameron	Oct 8 2021	H. Weaver	No	Functional	
941801	1-18-00158-DEL	11	Dec 30 2021	H. Weaver	Oct 5 2022	H. Weaver	No	Functional	
941801	1-18-00158-DEL	12	Dec 30 2021	H. Weaver	Oct 5 2022	H. Weaver	No	Functional	
941801	1-18-00158-DEL	15	Nov 12 2020	M. Cameron	Oct 8 2021	H. Weaver	No	Functional	
941801	1-18-00158-DEL	17	Dec 30 2021	H. Weaver	Sep 23 2022	Others	No	Functional	
941801	1-18-00158-DEL	18	Nov 11 2020	M. Cameron	Oct 8 2021	H. Weaver	No	Functional	
941801	1-18-00158-DEL	19	Nov 11 2020	M. Cameron	Sep 23 2022	Others	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
941801	1-18-00158-DEL	20	Nov 11 2020	M. Cameron	Sep 23 2022	Others	No	Functional	
941801	1-18-00158-DEL	34	Oct 31 2020	M. Cameron	Oct 19 2021	T. Wills-Pendley	No	Functional	
951701	1-18-107DEL	01	Nov 11 2020	M. Cameron	Oct 19 2021	M. Lewis	No	Functional	
951701	1-18-107DEL	10	Nov 18 2020	M. Cameron	Nov 9 2021	T. Wills-Pendley	No	Functional	
951701	1-18-107DEL	11	Nov 18 2020	M. Cameron	Oct 19 2021	M. Lewis	No	Functional	
952101	1-22-00002-Del	2	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	5	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	6	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	100	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	101	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	102	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	103	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	104	Sep 21 2022	H. Weaver			No	Functional	
952101	1-22-00002-Del	105	Sep 21 2022	H. Weaver			No	Functional	
N/A	N/A	B-10.13L_02	Sep 20 2022	Others			No	Functional	
N/A	N/A	BL-2100_01	Aug 31 2021	J. Wright	Jul 19 2022	Others	No	Functional	
N/A	N/A	BL-2100_02	Aug 31 2021	J. Wright	Jul 19 2022	Others	No	Functional	
N/A	N/A	C-1000_01	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_02	Nov 22 2021	E. Haffner	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_03	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_04	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_05	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_06	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1000_07	Nov 22 2021	E. Haffner	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-1400_01	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	C-2000_01	Nov 9 2021	H. Weaver	Aug 15 2022	Others	No	Functional	
N/A	N/A	CP-2090_01	Nov 10 2021	E. Haffner	Sep 16 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	CR 2629.86R-01	Nov 5 2021	E. Haffner	Jul 15 2022	Others	No	Functional	
N/A	N/A	CR-2222.22L-001	Aug 24 2021	M. Lewis	Jul 6 2022	N. Ludington	No	Functional	
N/A	N/A	CR-2900_01	Sep 15 2021	M. Lewis	Jul 20 2022	Others	No	Functional	
N/A	N/A	CR-2900_02	Aug 19 2021	N. Ludington	Jul 20 2022	Others	No	Functional	
N/A	N/A	CR-3180-01	Sep 17 2021	M. Lewis	Jul 6 2022	N. Ludington	No	Functional	
N/A	N/A	CR3180-02	Sep 17 2021	M. Lewis	Jul 11 2022	Others	No	Functional	
N/A	N/A	CR-3350-01	Aug 17 2021	M. Lewis	Jul 11 2022	Others	No	Functional	
N/A	N/A	CR-3350-02	Aug 17 2021	M. Lewis	Jul 11 2022	Others	No	Functional	
N/A	N/A	CR-3350-03	Aug 17 2021	M. Lewis	Jul 11 2022	Others	No	Functional	
N/A	N/A	Dolly Varden Road_02	Jan 3 2022	M. Lewis	Nov 7 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	Dolly Varden Road_03	Jan 3 2022	M. Lewis	Nov 7 2022	T. Wills-Pendley	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
N/A	N/A	Fh-900_03	Jun 17 2022	N. Ludington			No	Functional	
N/A	N/A	H-500-01-EM	Aug 11 2020	M. Lewis	Nov 22 2021	T. Wills-Pendley	No	Functional	
N/A	N/A	H-580.01_01	Nov 22 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	H-580_01	Jun 28 2021	L. Judevine	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	H-580_02	Jun 28 2021	L. Judevine	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	H-580_03	Jun 28 2021	L. Judevine	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	H-580_04	Jun 28 2021	L. Judevine	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	K&K 820_01	Oct 22 2021	H. Weaver	Jul 15 2022	Others	No	Functional	
N/A	N/A	K&K 820_02	Oct 22 2021	H. Weaver	Jul 15 2022	Others	No	Functional	
N/A	N/A	LS-150_01	Nov 29 2022	Others			No	Functional	
N/A	N/A	MR-4200_01_eh	Dec 2 2022	Others			No	Functional	
N/A	N/A	MR-4200_02_eh	Dec 12 2022	Others			No	Functional	
N/A	N/A	MR-4200_2.1_eh	Dec 2 2022	Others			No	Functional	
N/A	N/A	MR-7010_01	Sep 30 2022	Others			No	Functional	
N/A	N/A	R-7_01	Nov 4 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
N/A	N/A	R-7_02	Nov 4 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
N/A	N/A	R-Line_01	Nov 4 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
N/A	N/A	R-Line_02	Nov 4 2021	H. Weaver	Aug 5 2022	Others	No	Functional	
N/A	N/A	SA_2700_09_HW_2021	Nov 29 2022	Others			No	Functional	
N/A	N/A	SA-2000_02_HW_092021	Nov 29 2022	Others			No	Functional	
N/A	N/A	SA-2000_03_HW	Nov 29 2022	Others			No	Functional	
N/A	N/A	SA-2700_07_HW	Nov 29 2022	Others			No	Functional	
N/A	N/A	T-10.55R_01	Jul 15 2022	T. Wills-Pendley			No	Functional	
N/A	N/A	T-10.55R_02	Jul 15 2022	T. Wills-Pendley			No	Functional	
N/A	N/A	T-10.55R_03	Jul 15 2022	T. Wills-Pendley			No	Functional	
N/A	N/A	T-10.55R-04	Sep 22 2022	Others			No	Functional	
N/A	N/A	T-10.55R-05	Aug 23 2022	T. Wills-Pendley			No	Functional	
N/A	N/A	T-10.64R-01	Nov 30 2022	Others			No	Functional	
N/A	N/A	T-10.64R-02	Nov 30 2022	Others			No	Functional	
N/A	N/A	T-10.75R_01	Nov 22 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500_02	Nov 4 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500_03	Nov 4 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500_04	Nov 4 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500-01	Nov 3 2020	M. Lewis	Jul 8 2021	M. Lewis	No	Functional	
N/A	N/A	T-500-05	Jul 8 2021	M. Lewis	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500-06	Jul 8 2021	M. Lewis	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-500-07	Jul 8 2021	M. Lewis	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-600_01	Nov 22 2021	T. Wills-Pendley	Jul 15 2022	T. Wills-Pendley	No	Functional	

GDRCO #	State #	Road Point	Pre-Winter Inspection Date	RPF Pre-Inspection	Post-winter Inspection Date	RPF Post-Inspection	Issues Identified	Functional Status	Notes
N/A	N/A	T-600_02	Nov 22 2021	T. Wills-Pendley	Jul 15 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T700.44R_01	Nov 22 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T700_02	Nov 22 2021	T. Wills-Pendley	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	T-960_01	Jun 30 2021	L. Judevine	Jul 14 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	U-1400_01	Nov 22 2021	T. Wills-Pendley	Sep 9 2022	Others	No	Functional	
N/A	N/A	U-400_01	Nov 22 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	U-400_02	Nov 22 2021	T. Wills-Pendley	Aug 9 2022	T. Wills-Pendley	No	Functional	
N/A	N/A	WM-1830_01	Nov 8 2021	T. Wills-Pendley			No	Functional	

Appendix C

2022 Summer Juvenile Salmonid Population Sampling Program – Annual Report to NMFS

Green Diamond Resource Company's Annual Report

To

National Marine Fisheries Service

For

Permit 17351-2R

Summer Juvenile Salmonid Population Sampling Program

2022

Prepared by:

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INTRODUCTION

In 2022, Green Diamond Resource Company (GDRCo) conducted its twenty-eight year of summer juvenile salmonid population monitoring, under a National Marine Fisheries Service (NMFS) Section 10 Permit (17351). This permit is required to cover take of Endangered Species Act (ESA) listed salmonids that may result from monitoring activities. The covered species include the Southern Oregon/North Coastal California (SONCC) coho salmon (*Oncorhyncus kisutch*) evolutionarily significant unit (ESU), the California Coastal (CC) Chinook Salmon (*Oncorhyncus tshawytscha*) ESU, and the Northern California (NC) steelhead trout (*Oncorhyncus mykiss*) distinct population segment (DPS). A Scientific Collection Permit (SCP) and a Memorandum of Understanding (MOU) for coho salmon from the California Department of Fish and Wildlife (CDFW) were also obtained to allow for the implementation of this project.

Single stream summer juvenile salmonid population monitoring is a component of the Effectiveness Monitoring Program under the GDRCo Aquatic Habitat Conservation Plan (AHCP; GDRCo, 2006). This monitoring program allows GDRCo to obtain annual estimates on juvenile salmonids (coho salmon, steelhead trout, coastal cutthroat trout and occasionally Chinook salmon). Where possible, the summer estimates for juvenile coho can be compared with coho smolt production estimates from an outmigrant trapping program to yield an apparent over-winter survival rate for juvenile coho populations. The apparent over-winter survival rates are provided in the 2022 outmigrant trapping report (GDRCo, 2022). The summer population estimates help to establish baseline and long-term trend data on the abundance of juvenile salmonid populations.

Eleven creeks were sampled in 2022 and are distributed among five hydrographic planning areas (HPAs) as defined in the GDRCo Aquatic Habitat Conservation Plan (GDRCo 2006). The sample design and protocol employed was that described by Hankin and Mohr (2001), and is based primarily on diver observations, with repeat passes and electrofishing used to calibrate the probability of detection. Counts of juvenile coho salmon, 1+ steelhead trout and coastal cutthroat trout were conducted in 2022 and population sizes were estimated.

This report presents the results from the 2022 summer juvenile population monitoring effort and makes select comparisons to past monitoring dating as far back as 1995 in some of these streams. In addition to population estimates, this report summarizes the number of ESA listed salmonids observed, handled, and incidentally taken during each part of project implementation.

METHODS

Study Sites

Eleven monitoring sites were sampled in 2022. The streams surveyed were Ah Pah Creek, Cañon Creek, Hunter Creek, Little Surpur Creek, Lower South Fork Little River, South Fork Ah Pah Creek, South Fork Rowdy Creek / Savoy Creek, South Fork Winchuck River, Sullivan Gulch, Upper South Fork Little River and Wilson Creek. Collectively, these sites represent five HPAs along north coastal California; Smith River, Coastal Klamath, Little River, North Fork Mad River, and Mad River (Appendix 1). These monitoring sites are restricted to anadromous coho salmon habitats located in sub-basins within lands predominantly owned by GDRCo. Each site consists of a linear segment(s) of stream and the extent of each reach was determined by evidence of coho anadromy and can vary in length from year to year.

Sampling Design

The sampling methodologies used by GDRCo for estimating summer juvenile salmonid populations have evolved over the years with advances in fisheries population monitoring techniques. The sampling design described by Hankin and Reeves (1988) was used from 1995 to 2000. From 2001 to the present, the two-phase sampling design described by Hankin and Mohr (2001) was employed. This new sampling design increased the use of diver counts and reduced the amount of electrofishing and the associated deleterious effects on listed species and other stream biota. Using this technique, sampling varies based on stream habitat type. The sampling rate for deep pools is 50% for Phase I and 100% for Phase II dives. For shallow units the sampling rate is 50% for both Phase I and Phase II dives. Riffles are sampled randomly at 8.5% (1 in 12). The electrofishing protocol is a minimum of 3 passes and depletion. Detailed GDRCo field protocols are maintained and available upon request. In 2022, at Lower South Fork Little River (LSFLR), the sampling rate for Phase II shallow pools was reduced from 50% to 33% to decrease electrofishing in this particular reach. LSFLR consistently produces high densities of coho juveniles and this modification to the sampling design was implemented in an effort to reduce our electrofishing footprint while still obtaining a reliable population estimate. Details on the electrofishing equipment used are provided in Appendix 2. The NMFS guidelines were followed when operating an electrofisher (Schaeffer and Logan 2000).

In addition to adopting the improved sampling design, there have been other modifications to the protocol over the years. Prior to 1999, the difference between a deep pool and a shallow pool was subjective and based on the surveyors' opinion on electrofishing effectiveness for the particular unit. Beginning in the 1999 field season, the decision between deep or shallow pools was based solely on depth. A pool less than 3.4 feet was a shallow pool. This provided better consistency between personnel, improving the validity of comparisons of population estimates between different streams, surveyors, and organizations or agencies. Additionally, starting in 2001, run habitat was grouped with the shallow pool habitat stratum because small sample sizes for runs prohibited treating them separately. This change was adopted to improve the estimates because of the increased number of calibrated shallow pools.

Population Estimates

Estimates and confidence intervals were generated using the updated estimators of abundance and variance described by Mohr and Hankin (2005). The estimators were written in R code by Mike Mohr and Western EcoSystems Technology Inc. (WEST-Inc.). The primary improvements in these estimators are the addition of bias adjustments associated with diver count and electrofishing probabilities of detection, to reduce the bias of the bounded counts and jackknife estimators, respectively. This improved estimator was applied to the earlier (pre-2005) data as well. Where the application of these estimators was not possible, due to either protocol variance or small sample size, hard counts or bounded counts, were used. These were usually limited to a single habitat stratum (e.g., runs) and could not be extrapolated to the entire stream for that year.

During the diving component of the surveys, counts were recorded for coho, Chinook, cutthroat (≥1+), and steelhead (≥1+). No attempts were made to count 0+ trout, though they are enumerated during electrofishing. Estimates were generated for coho, steelhead and cutthroat only. Each stream was surveyed to the upper extent of coho anadromy. Surveyed extents for each stream are depicted on maps provided in

For estimates presented in this report, the shallow unit (SU) habitat stratum includes runs (1995-2000), riffles, and shallow pools (which included runs after 2000). When combined, the estimates of abundance and variances of each stratum were summed for the combined category estimate (Zar, 1999). The product of the variance for SU was then used to calculate the confidence interval (CI). In cases where the sample size for a shallow habitat type was one, an estimate could not be calculated, and thus, the hard count or bounded count for this habitat type was summed with the estimates for the other SU habitat types. Confidence intervals were then calculated as described above using the sum of available variances.

While all data have been audited for accuracy and consistency as of this report, GDRCo maintains a data quality routine that occasionally detects previously unidentified errors. Any historical estimates presented in this report that may differ from previously reported figures, should be considered the most accurate.

RESULTS

Survey Effort and Habitat Composition

Stream habitat composition and sampling rates were summarized for each stream surveyed in 2022 (Table 1). Overall, the desired sampling rate for the different habitat stratum was achieved. The habitat stratum "other" was not surveyed for summer juvenile salmonids. Other habitats included: dry stream sections, isolated side-channel pools clearly not providing fish habitat, or units where LWD, SWD or undercut banks were abundant enough to prevent effective observation or safe electrofishing. No take of ESA listed SONCC coho salmon, CC Chinook salmon, or NC steelhead occurred during the habitat typing process.

Dive Counts

A summary of the fish counts from the dive portion of the stream sampling was compiled for all sites monitored (Table 2). A total of 9,721 juvenile salmonids were observed in 2022. Four salmonid species were observed but coho and steelhead were the two dominant species, accounting for 81% and 15% respectively, of the total salmonid observations. No take of ESA listed SONCC coho salmon, CC Chinook salmon, or NC steelhead occurred during the dive component.

Electrofishing

The eleven monitoring sites were electroshocked from July 26th through October 18th 2022. A summary of sampling dates, habitat units sampled, maximum water temperature, electrofishing effort, maximum conductivity and maximum voltage used for the electrofishing portion of the survey are provided below for each site (Table 3). The water temperatures and conductivities at all sampled sites were within the acceptable ranges.

The total number of individuals captured during the electrofishing portions of the surveys and associated mortality by stream and species were summarized (Table 4). A total of 8,681 salmonids were captured. The majority (47.7%) of captures were coho, followed by trout (45.7%), steelhead (4.6%) and cutthroat (2.0%). There were five trout 0+ mortalities, one Coho 0+ mortality and one cutthroat 1+ mortality observed during the 2022 summer juvenile population estimate survey. The overall mortality rate for electroshocked salmonids in 2022 was 0.08% (7 out of 8,681). A summary of the possible ESA listed salmonid mortalities resulting from the 2022 electrofishing effort was compiled (Table 5). The overall mortality rate for possible ESA listed electroshocked salmonids in 2022 was 0.06% (4 of 5,799).

Summer Juvenile Population Estimates

The 2022 population estimates, and corresponding confidence intervals were summarized for the sites sampled (Table 6). Bar graphs were used to summarize the full history of estimates for coho (Figures 1-4) and steelhead (Figures 5-8) by stream for the 11 creeks sampled. The data used to create these figures are presented in Appendix 3. When possible, population estimates were generated using the most recent estimators of abundance and variance including the bias adjustments described in Mohr and Hankin (2005). In some cases, there were no units available, only one unit available or not enough units were sampled of a certain habitat type to use the standard estimation procedure. In those cases, either hard counts or single unit estimates with no variance are displayed. In other cases, the protocol was still being developed so the data was not available to use the standard estimation procedure. In those cases, the hard count numbers were used or the hard count numbers were added to the estimated numbers to give a value with no variance. Footnotes are included in Appendix 3 to indicate the estimation method used to calculate the values.

The results presented in this section are only for those sites monitored during the 2022 sampling period. However, the sites monitored over the history of this project have changed over time and some results from sampling at discontinued sites (N = 6) have been provided in Appendix 3. Justification for discontinuing sites has been provided in past annual monitoring reports or AHCP biennial reports (e.g., GDRCo 2015).

Table 1. Summary of stream habitat composition and sampling effort at sites monitored by GDRCo in 2022.

		Habitat Type				
Creek Name	**Criteria**	**Deep Pool**	**Shallow Pool**	**Riffle**	**Other**	**Total**
Ah Pah Creek	# Units	7	101	106	46	260
	Surveyed Units	4	50	9	0	63
	Percent Surveyed	57.1%	49.5%	8.5%	0.0%	24.2%
Cañon Creek	# Units	24	85	85	42	236
	Surveyed Units	12	42	7	0	61
	Percent Surveyed	50.0%	49.4%	8.2%	0.0%	25.8%
Hunter Creek	# Units	11	74	86	44	215
	Surveyed Units	5	37	7	0	49
	Percent Surveyed	45.5%	50.0%	8.1%	0.0%	22.8%
Little Surpur Creek	# Units	0	23	21	2	46
	Surveyed Units	0	11	2	0	13
	Percent Surveyed	0.0%	47.8%	9.5%	0.0%	28.3%
Lower South Fork Little River	# Units	13	124	100	37	274
	Surveyed Units	6	42	9	0	57
	Percent Surveyed	46.2%	33.9%	9.0%	0.0%	20.8%
SF Ah Pah Creek	# Units	0	53	48	28	129
	Surveyed Units	0	26	4	0	30
	Percent Surveyed	0.0%	49.1%	8.3%	0.0%	23.3%
SF Rowdy and Savoy Creeks	# Units	0	96	111	41	248
	Surveyed Units	0	48	9	0	57
	Percent Surveyed	0.0%	50.0%	8.1%	0.0%	23.0%
SF Winchuck River	# Units	18	168	184	73	443
	Surveyed Units	8	84	15	0	107
	Percent Surveyed	44.4%	50.0%	8.2%	0.0%	24.2%
Sullivan Gulch	# Units	1	18	24	10	53
	Surveyed Units	0	9	2	0	11
	Percent Surveyed	0.0%	50.0%	8.3%	0.0%	20.8%
Upper South Fork Little River	# Units	10	137	108	18	273
	Surveyed Units	5	69	9	0	83
	Percent Surveyed	50.0%	50.4%	8.3%	0.0%	30.4%
Wilson Creek	# Units	22	78	95	61	256
	Surveyed Units	12	38	8	0	58
	Percent Surveyed	54.5%	48.7%	8.4%	0.0%	22.7%
Total	# Units	106	957	968	402	2,433
	Surveyed Units	52	456	81	0	589
	Percent Surveyed	49.1%	47.6%	8.4%	0.0%	24.2%

Table 2. Summary of salmonids observed during dive counts at each monitoring site sampled by GDRCo in 2022.

Creek Name	**0+ Chinook**	**0+ Coho**	**1+ Cutthroat**	**1+ Steelhead**
Ah Pah Creek	0	603	50	86
Cañon Creek	121	576	0	130
Hunter Creek	0	348	18	220
Little Surpur Creek	0	6	9	9
Lower South Fork Little River	0	2,852	14	46
SF Ah Pah Creek	0	20	14	26
SF Rowdy and Savoy	0	0	9	110
SF Winchuck River	0	2	105	421
Sullivan Gulch	2	210	0	1
Upper South Fork Little River	0	1,197	37	71
Wilson Creek	0	2,084	8	319
Total	123	7,898	264	1,439

Table 3. Summary of electroshocking sampling effort, maximum water temperature (MWT), maximum water conductivity (MC), maximum voltage (MV) and total time spent electrofishing for each monitoring site sampled by GDRCo in 2022.

Creek Name	Start Date	End Date	Sample Days	# Units Sampled * Riffle	# Units Sampled * Shallow Pool	MWT (°C)	MC (µS/cm)	MV (v)	Electrofishing Effort (sec.)
Ah Pah Creek	22-Sep	26-Sep	3	9	4	14.0	108	200	21,140
Cañon Creek	22-Aug	31-Aug	5	7	5	17.0	272	200	26,440
Hunter Creek	10-Oct	12-Oct	3	7	0	16.7	88	200	7,095
Little Supur Creek	26-Jul	26-Jul	1	3	0	11.0	68	200	3,266
Lower South Fork Little River	9-Sep	19-Sep	6	9	23	16.4	99	200	50,239
SF Ah Pah Creek	18-Oct	18-Oct	1	4	0	15.4	113	200	1,509
SF Rowdy and Savoy	12-Oct	17-Oct	3	9	0	15.4	120	200	9,084
SF Winchuck River	27-Sep	30-Sep	4	15	1	16.2	90	200	11,942
Sullivan Gulch	1-Sep	1-Sep	1	3	4	14.7	245	244	3,763
Upper South Fork Little River	6-Sep	8-Sep	3	9	10	16.3	79	200	18,773
Wilson Creek	3-Oct	7-Oct	4	8	7	15.0	90	200	16,902
Total:			34	83	54				170,153

** Units sampled by electroshocking.*

Table 4. Summary of salmonid captures and mortalities associated with electroshocking conducted at monitoring sites sampled by GDRCo in 2022.

Creek Name	Criteria	0+ Coho	1+ Steelhead	1+ Cutthroat	0+ Trout	0+ Chinook
Ah Pah Creek	# Captured	402	13	27	667	-
	# of Mortalities	0	0	0	0	-
	Percent Mortalities	0.0%	0.0%	0.0%	0.0%	-
Cañon Creek	# Captured	132	58	-	1044	17
	# of Mortalities	0	0	-	3	0
	Percent Mortalities	0.0%	0.0%	-	0.29%	0.0%
Hunter Creek	# Captured	-	14	11	89	-
	# of Mortalities	-	0	0	0	-
	Percent Mortalities	-	0.0%	0.0%	0.0%	-
Little Surpur Creek	# Captured	2	4	12	63	-
	# of Mortalities	0	0	0	0	-
	Percent Mortalities	0.0%	0.0%	0.0%	0.0%	-
Lower South Fork Little River	# Captured	2,451	11	55	257	-
	# of Mortalities	1	0	1	0	-
	Percent Mortalities	0.04%	0.0%	1.8%	0.0%	-
SF Ah Pah Creek	# Captured	-	2	4	51	-
	# of Mortalities	-	0	0	0	-
	Percent Mortalities	-	0.0%	0.0%	0.0%	-
SF Rowdy and Savoy Creeks	# Captured	-	48	12	296	-
	# of Mortalities	-	0	0	1	-
	Percent Mortalities	-	0.0%	0.0%	0.34%	-
SF Winchuck River	# Captured	-	89	12	382	-
	# of Mortalities	-	0	0	1	-
	Percent Mortalities	-	0.0%	0.0%	0.26%	-
Sullivan Gulch	# Captured	209	1	-	-	3
	# of Mortalities	0	0	-	-	0
	Percent Mortalities	0.0%	0.0%	-	-	0.0%
Upper South Fork Little River	# Captured	480	19	41	268	-
	# of Mortalities	0	0	0	0	-
	Percent Mortalities	0.0%	0.0%	0.0%	0.0%	-
Wilson Creek	# Captured	445	138	2	850	-
	# of Mortalities	0	0	0	0	-
	Percent Mortalities	0.0%	0.0%	0.0%	0.0%	-
Total	# Captured	4,121	397	176	3,967	20
	# of Mortalities	1	0	1	5	0
	Percent Mortalities	0.02%	0.0%	0.57%	0.13%	0.0%

"-" represents no capture of species.

Table 5. Summary of captures and possible mortalities for Federal Endangered Species Act (ESA) listed salmonids associated with electroshocking conducted at monitoring sites sampled by GDRCo in 2022.

Species	ESU / DPS	ESA Status	Age Class	Captured^	Mortalities #	Mortalities %
Coho	SONCC	Threatened	0+	4,121	1	0.02%
Chinook	CC	Threatened	0+	20	0	0.00%
Steelhead	NC	Threatened	0+	1,569	3	0.19%
Steelhead	NC	Threatened	1+	89	0	0.00%

^ Captured by electroshocking

Table 6. Summer juvenile population estimates and confidence intervals (CI) for three salmonid species at monitoring sites sampled by GDRCo in 2022.

		Deep Pool		Shallow Pool		Riffle		Total
Creek Name	**Species**	**Estimate**	**95% CI**	**Estimate**	**95% CI**	**Estimate**	**95% CI**	**Estimate**
Ah Pah Creek	Coho	260	205	1271	861	259	343	1,790
	Cutthroat	42	34	165	85	153	102	360
	Steelhead	12	10	143	34	118	180	272
Cañon Creek	Coho	533	197	808	295	24	30	1,366
	Cutthroat	0	0	0	0	0	0	0
	Steelhead	124	44	221	120	134	117	479
Hunter Creek	Coho	400	133	556	124	0	0	956
	Cutthroat	15	15	27	12	137	179	178
	Steelhead	368	133	431	105	180	227	978
Little Surpur Creek	Coho	-	-	13	5	14	13	27
	Cutthroat	-	-	18	9	90	101	107
	Steelhead	-	-	20	14	28	26	48
Lower SF Little River	Coho	930	280	11,860	2,092	1,912	1,859	14,701
	Cutthroat	42	21	680	504	78	126	800
	Steelhead	70	31	91	64	0	0	161
SF Ah Pah Creek	Coho	-	-	64	47	0	0	64
	Cutthroat	-	-	39	26	48	65	87
	Steelhead	-	-	60	29	48	67	108
SF Rowdy - Savoy Creek	Coho	-	-	0	0	0	0	0
	Cutthroat	-	-	42	34	148	137	190
	Steelhead	-	-	272	61	592	450	864
SF Winchuck River	Coho	8	9	2	4	0	0	10
	Cutthroat	68	18	181	65	135	117	384
	Steelhead	360	87	1132	372	429	324	1,921
Sullivan Gulch	Coho	65	0	463	124	542	489	1,070
	Cutthroat	0	0	0	0	0	0	0
	Steelhead	0	0	2	3	0	0	2
Upper SF Little River	Coho	502	283	2,351	448	1338	2090	4,191
	Cutthroat	33	19	178	89	120	184	331
	Steelhead	42	12	133	54	48	50	223
Wilson Creek	Coho	2,490	972	2,180	801	267	317	4,937
	Cutthroat	12	13	0	0	24	30	36
	Steelhead	508	243	382	198	515	352	1,405
Total	Coho	5,187	-	19,555	-	4,343	-	29,085
	Cutthroat	212	-	1,312	-	842	-	2,366
	Steelhead	1,484	-	2,865	-	2,063	-	6,412

- not applicable

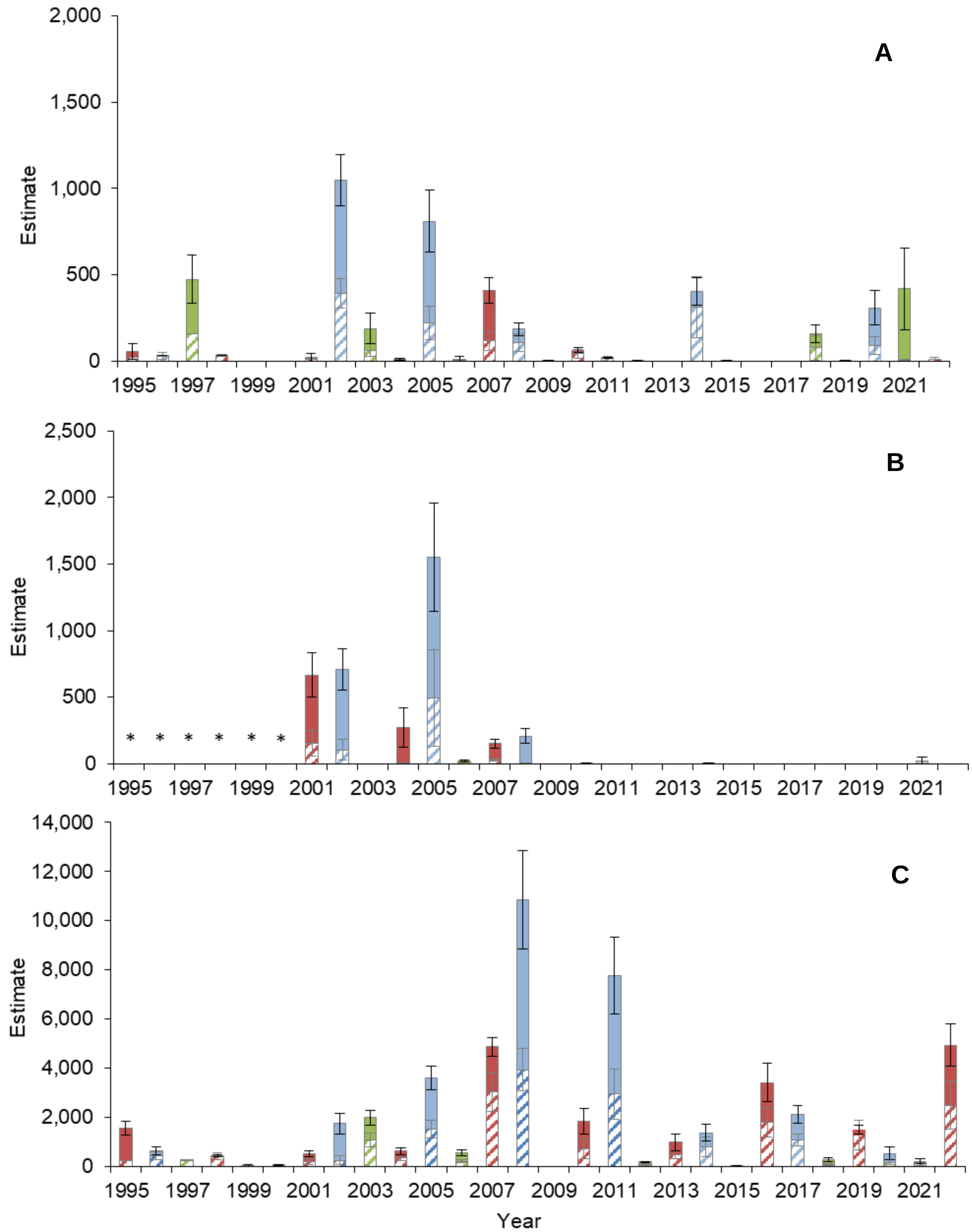

Figure 1. Histograms of Smith River HPA summer juvenile coho population estimates with confidence intervals for deep pools (diagonal striped bars) and shallow units (solid bars) at SF Winchuck River (A), SF Rowdy/Savoy Creeks (B), and Wilson Creek (C) sampled by GDRCo. Colors indicate three distinct cohorts of coho and an asterisk (*) indicates year(s) when sampling was not conducted. Scale on y-axes vary among histograms.

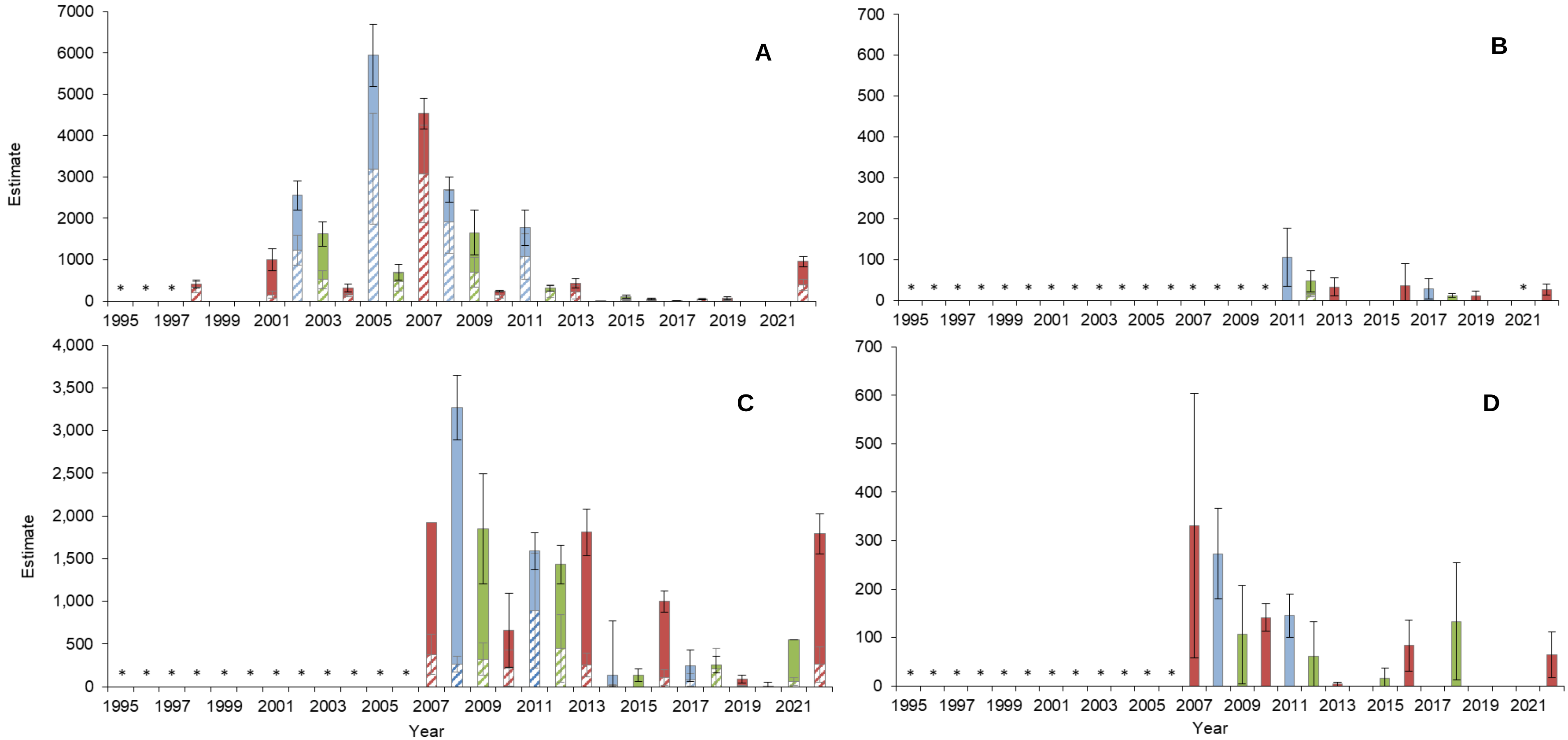

Figure 2. Histograms of Coastal Klamath HPA summer juvenile coho population estimates with confidence intervals for deep pools (diagonal striped bars) and shallow units (solid bars) at Hunter Creek (A), Little Surpur Creek (B), Ah Pah Creek (C), and SF Ah Pah Creek (D) sampled by GDRCo. Colors indicate three distinct cohorts of coho and an asterisk (*) indicates year(s) when sampling was not conducted. Scale on y-axes vary among histograms.

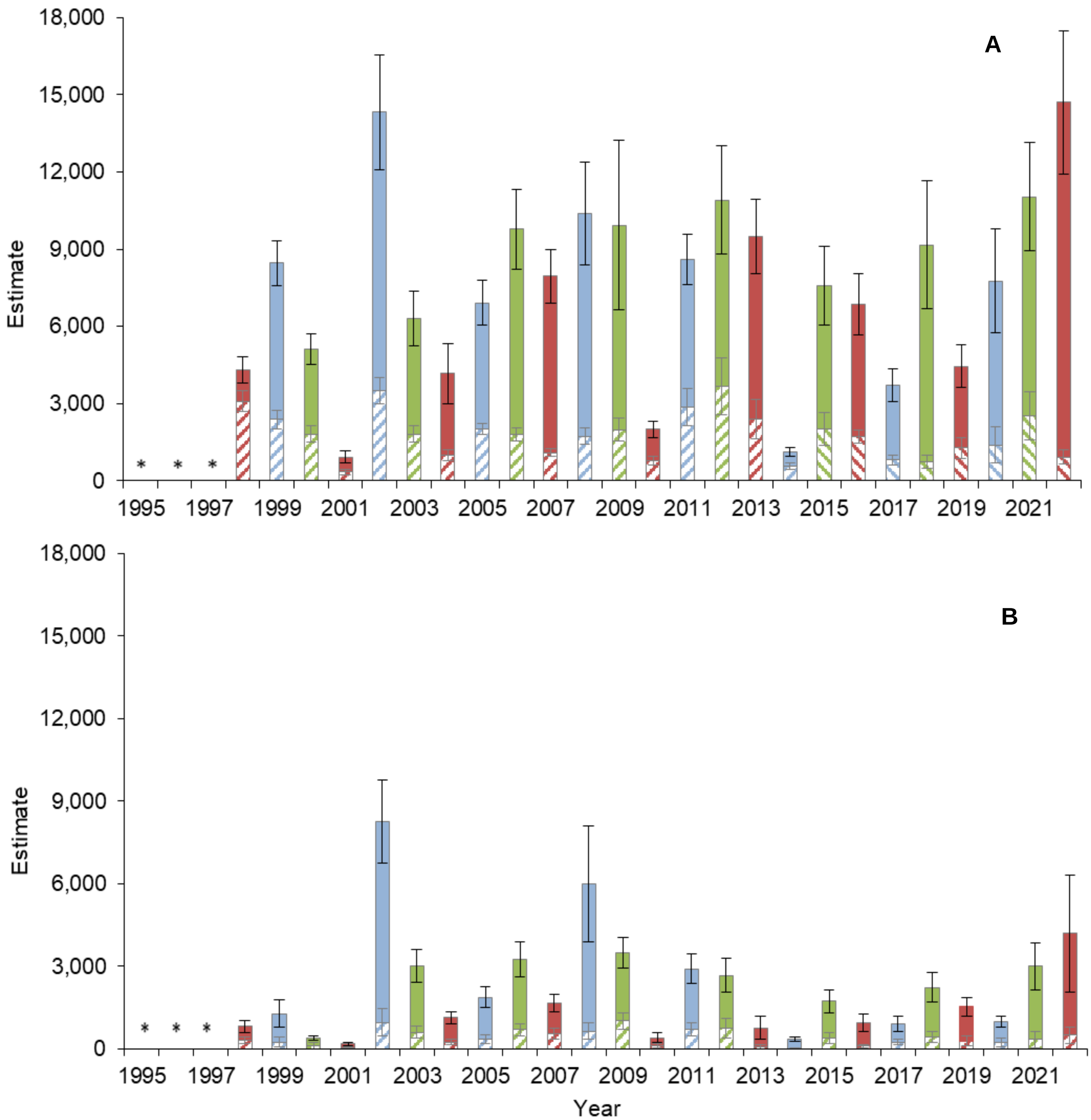

Figure 3. Histograms of Little River HPA summer juvenile coho population estimates with confidence intervals for deep pools (diagonal striped bars) and shallow units (solid bars) at Lower SF Little River (A), and Upper SF Little River (B) sampled by GDRCo. Colors indicate three distinct cohorts of coho and an asterisk (*) indicates year(s) when sampling was not conducted.

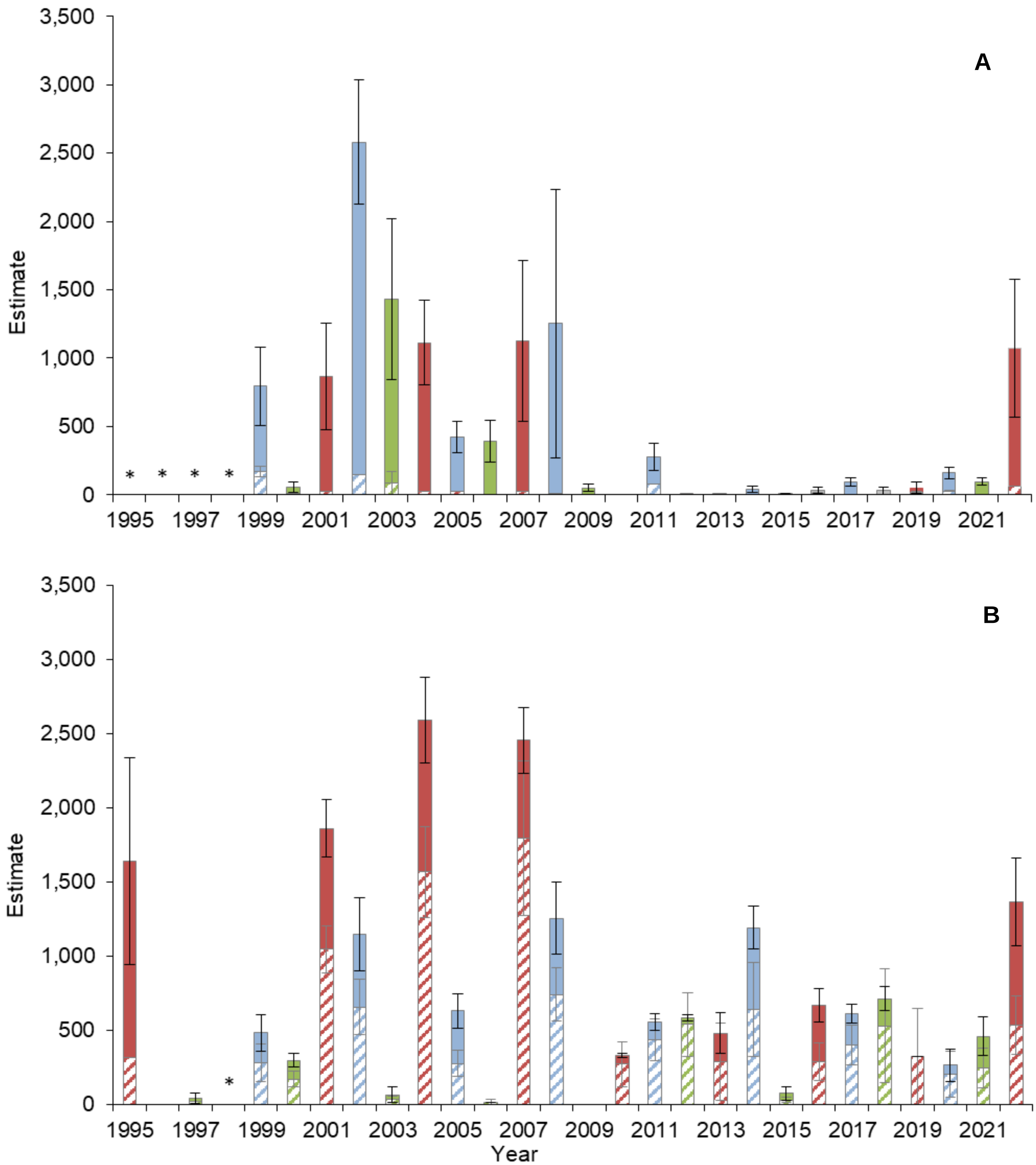

Figure 4. Histograms of Mad River and North Fork Mad River HPAs summer juvenile coho population estimates with confidence intervals for deep pools (diagonal striped bars) and shallow units (solid bars) at Sullivan Gulch (A) and Cañon Creek (B) sampled by GDRCo. Colors indicate three distinct cohorts of coho and an asterisk (*) indicates year(s) when sampling was not conducted.

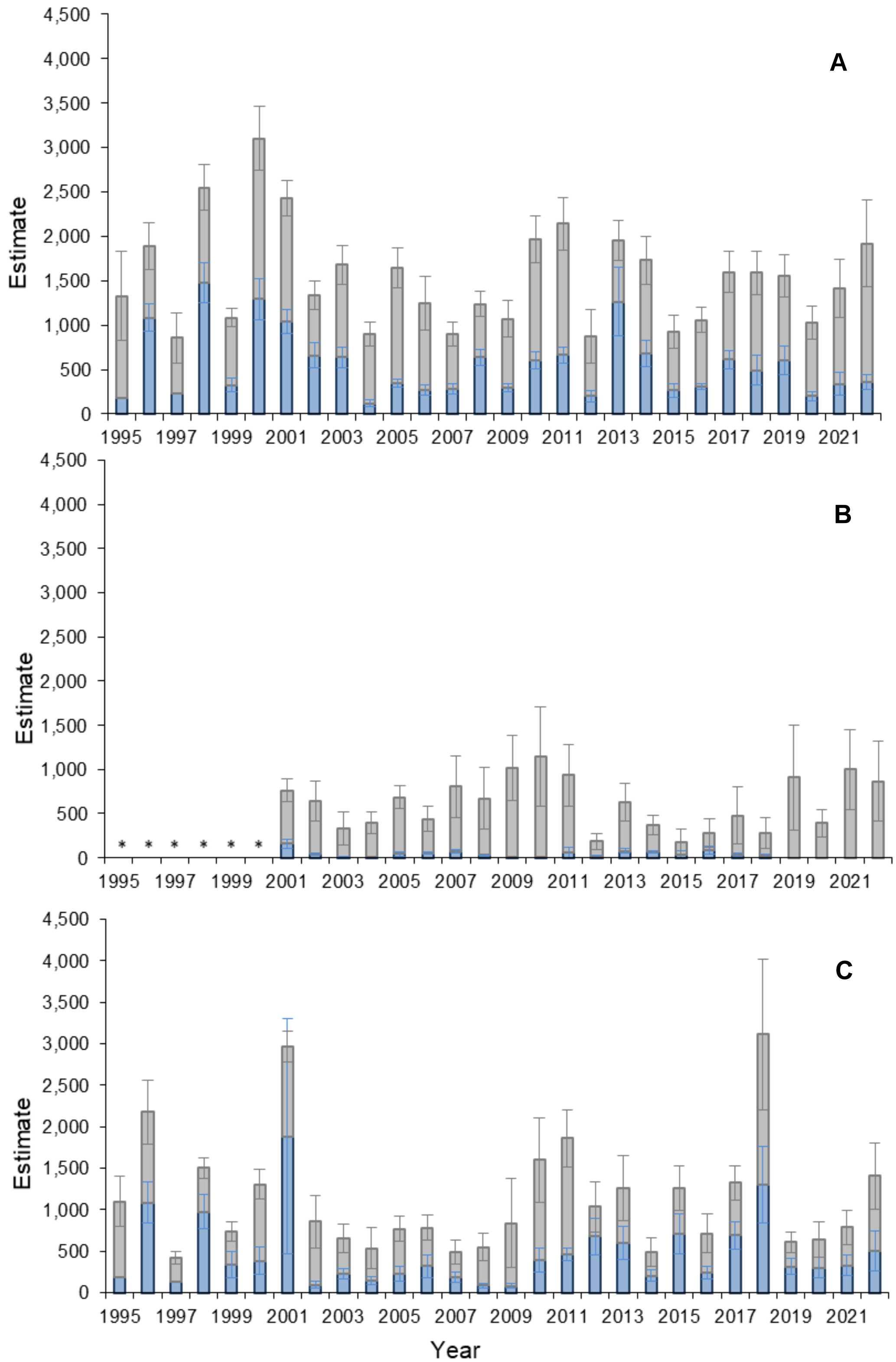

Figure 5. Histograms of Smith River HPA summer juvenile steelhead population estimates with confidence intervals for deep pools (blue) and shallow units (gray) at SF Winchuck River (A), SF Rowdy/Savoy Creeks (B), and Wilson Creek (C) sampled by GDRCo. An asterisk (*) indicates year(s) when sampling was not conducted.

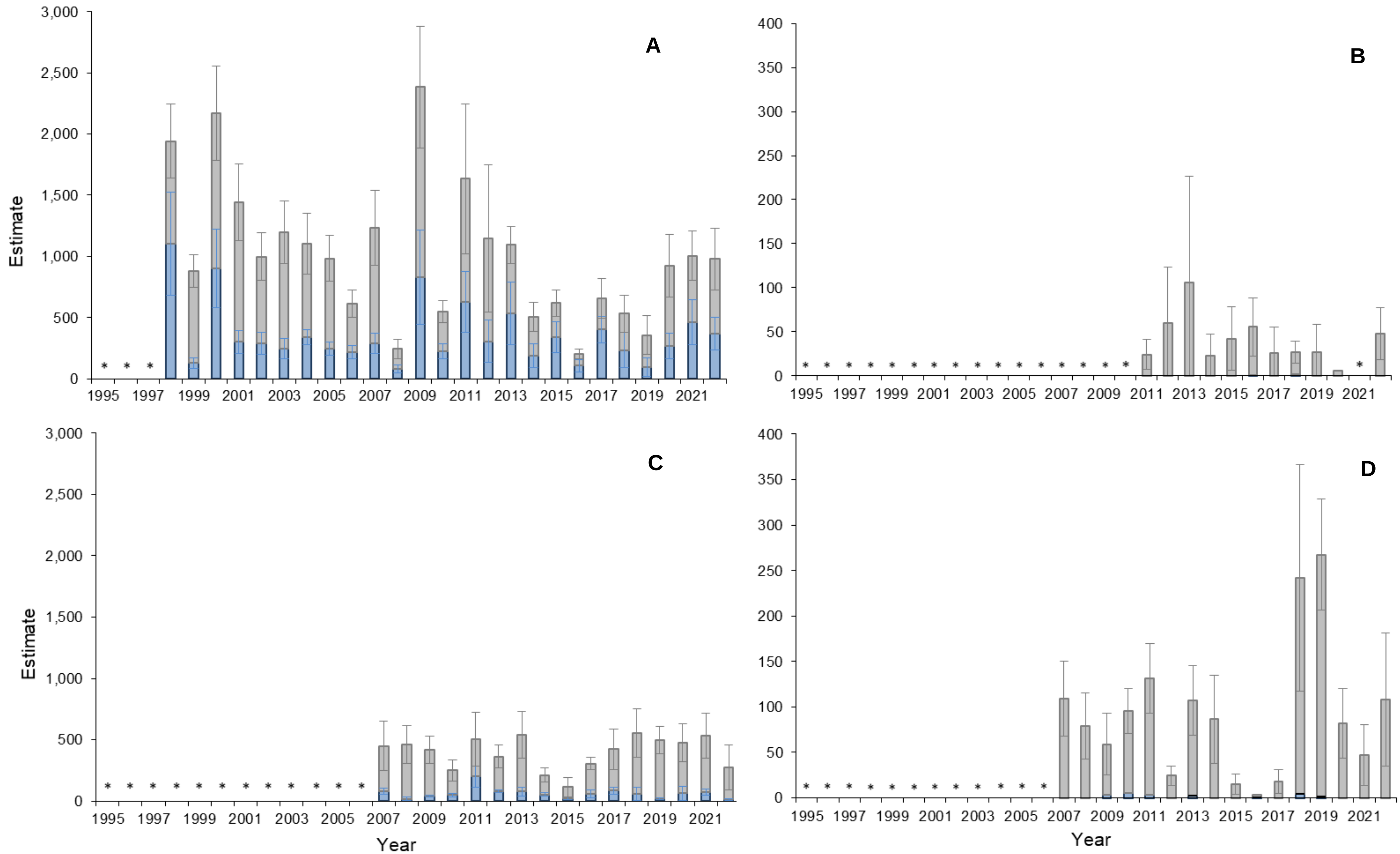

Figure 6. Histograms of Coastal Klamath HPA summer juvenile steelhead population estimates with confidence intervals for deep pool units (blue) shallow units (gray) at Hunter Creek (A), Little Surpur Creek (B), Ah Pah Creek (C), and SF Ah Pah Creek (D) sampled by GDRCo. An asterisk (*) indicates year(s) when sampling was not conducted. Scale on y-axes vary among histograms.

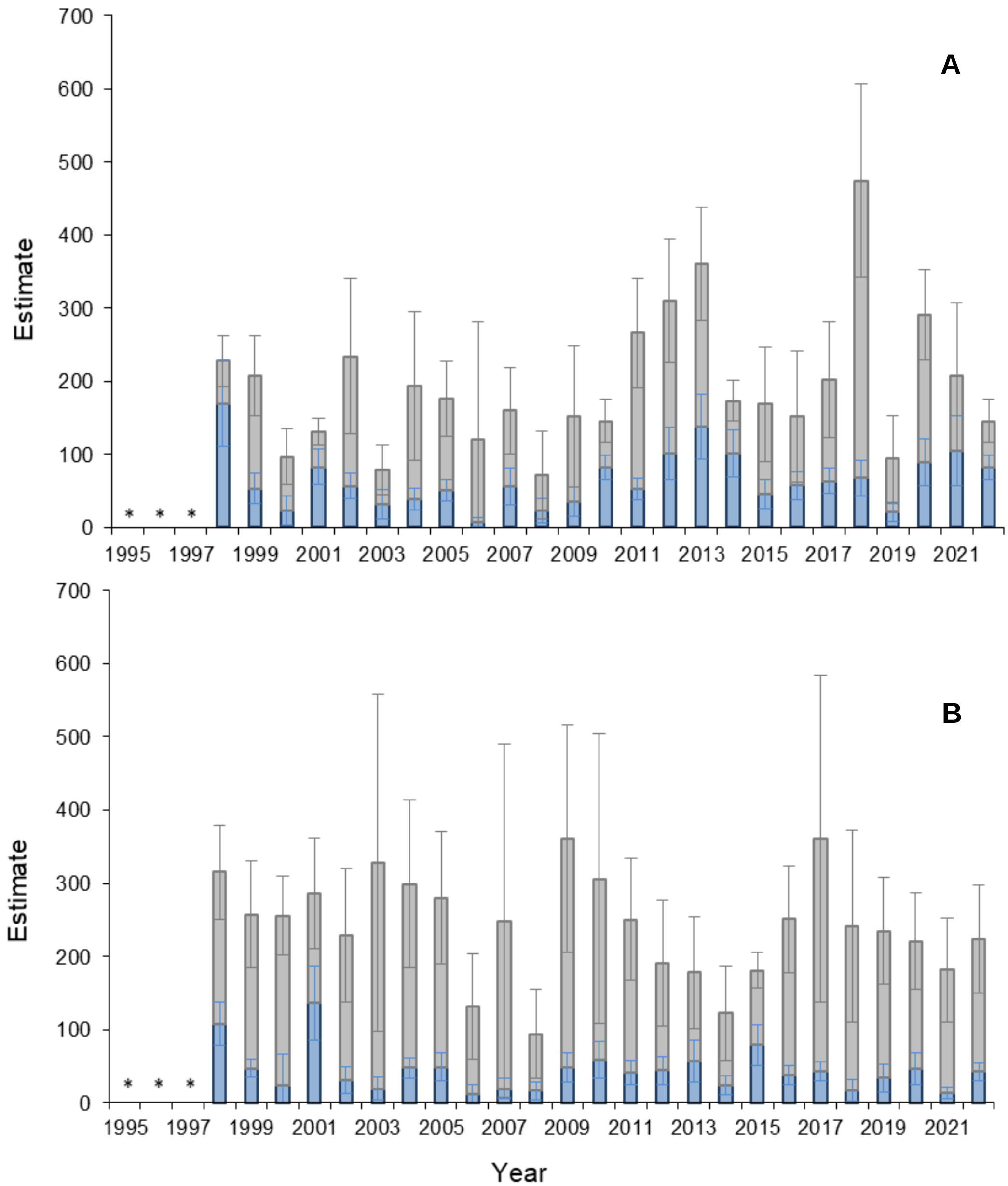

Figure 7. Histograms of Little River HPA summer juvenile steelhead population estimates with confidence intervals for deep pool units (blue) and shallow units (gray) at Lower SF Little River (A), and Upper SF Little River (B) sampled by GDRCo. An asterisk (*) indicates year(s) when sampling was not conducted.

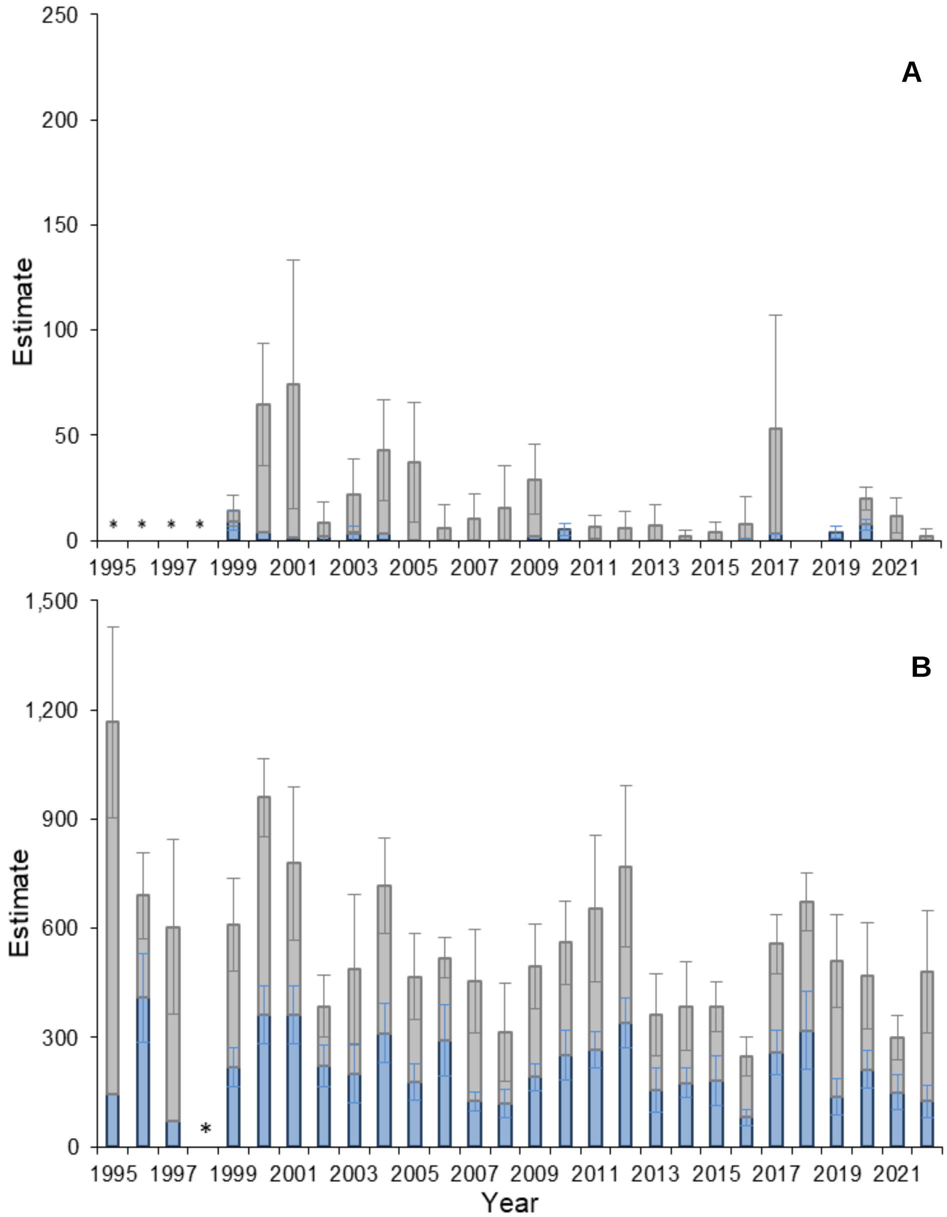

Figure 8. Histograms of Mad River and North Fork Mad River HPAs summer juvenile steelhead population estimates with confidence intervals for deep pool units (blue) and shallow units (gray) at Sullivan Gulch (A) and Cañon Creek (B) sampled by GDRCo. An asterisk (*) indicates year(s) when sampling was not conducted. Scale on y-axes vary among histograms.

DISCUSSION

Population Estimates

There was a lot of variability from north to south in summer juvenile population estimates for coho among the sites monitored in 2022. In the Smith River HPA, the SF Winchuck coho estimate (10) continues to be low or none for this cohort since its peak in 2007 (115). There were no coho detected in South Fork Rowdy/Savoy despite the 2021 coho estimate (21) that ended a six-year streak of no coho detections. Coho at these two most northern sites over the last 10 years have been low or not detected. In 2021, the planning of the restoration project of lower Rowdy Creek to improve fish passage past the hatchery has commenced and implementation of that project will take place over the next couple years. It will be interesting to see if coho estimates increase in this watershed during the years following restoration implementation.

GDRCo has operated a turbidity threshold sampling station in lower SF Winchuck since 2008 and the watershed has consistently produced some of the lowest suspended sediment values observed across our California timberlands. The reason for the lack of coho in the SF Winchuck basin is unclear but water quality does not appear to be a major contributing factor. Wilson Creek is our most southern watershed in the Smith River HPA. The 2022 coho estimate (4,937) in Wilson Creek is the largest estimate we have observed in the watershed over the last 10 years, demonstrating that this moderate cohort is still capable of producing a healthy summer population of coho juveniles.

Population estimates calculated in the Coastal Klamath HPA continued to be variable at the monitoring sites in 2022; however, each site did have an increase in coho detections since the cohort was last estimated. Hunter Creek estimates over the last 10 years have been low, but in 2022 there was a significant increase in the coho estimate (956). There have been extensive habitat restoration projects implemented in Hunter Creek over the last 10 years and 2022 is the first apparent increase in population since the projects were implemented. It will be interested to see if population estimates continue to increase in Hunter Creek in the coming years as a potential response to restoration efforts. Little Surpur Creek was surveyed in 2022 and had a coho estimate of 27. The 2022 coho estimate (1,790) in Ah Pah Creek was a significant improvement from the previous 9 years and is above the long-term average (1,044) for this site.
Coho were observed in SF Ah Pah Creek in 2022 (64) after there were no detections during the previous three years.

The Little River HPA continues to be the most stable producer of coho juveniles on GDRCo ownership. In 2022, the estimates at both Lower SF Little River and Upper SF Little River increased compared to the last time this cohort was estimated in 2019. The 2022 Lower SF Little River coho estimate (14,701) is the largest on record for this site. Population estimates for coho in the Mad River and North Fork Mad River HPAs were the highest they have been since 2009. Sullivan Gulch had a significant increase in the coho estimate (1,070) and is comparable to estimates before 2009 for this site. Similarly, the Cañon Creek coho estimate (1,366) displayed a positive trend compared to recent years at this site.

In 2022, the coho estimate of all sampled reaches was 29,085. This almost twice as much as 2021 (15,791) and almost four times more than the last time this cohort was estimate in 2019 (8,022). The cause(s) of the observed coho juvenile population dynamics is unclear but they are presumably a result of multiple factors, including climate, ocean conditions, predator-prey dynamics, spawning and rearing habitat availability, and anthropogenic disturbances, acting synergistically. A detailed analysis is planned for the future and will possibly explain which of these factors are associated with the observed changes and confirm the existence of a pattern in summer juvenile coho salmon population estimates.

Steelhead juvenile estimates for 2022 were also variable among sites monitored. Comparing the 2022 estimates to the long-term averages shows that 8 out of the 11 sites were above their respective long-term averages. Sites with the most consistent and largest population estimates over time continue to be in the northernmost HPA's. There is no clear explanation for the observed changes in 2022 or the dynamics in steelhead juveniles documented over the term of this monitoring project. The cause(s) are likely the result of similar factors as mentioned above for coho salmon. Again, a detailed analysis is planned which should explore if some of these factors are associated with the observed changes in summer juvenile steelhead trout population estimates.

Mortalities

The efforts by GDRCo fisheries staff to minimize take of listed species were effective in 2022. Of the 8,681 salmonids captured during 47 hours (170,153 seconds) of electrofishing, there were only five trout 0+ mortalities, one Coho 0+ mortality and one cutthroat 1+ mortality. These fish were likely overexposed to electrical shock which resulted in direct mortality. This exceptionally low mortality is believed to be a direct result of the dedicated efforts from a consistent staff of well trained and experienced fisheries professionals employed at GDRCo.

Electrofishing is a valuable sampling technique but poses a risk to fish health (Snyder, 2003). Green Diamond followed strict protocol and ensured proper training of field crews to alleviate this potential risk. The crew monitored stream temperature and conductivity prior to and during electrofishing to confirm that temperatures were less than or equal to 18°C and/or water conductivity was less than or equal to 350 μS/cm. Finally, efforts were made to keep holding time of fish to a minimum, and when necessary, in-stream mesh holding pens were used to ensure that fish were retained in cold, well-oxygenated water.

With the high abundance of coho observed in 2022, a new technique of holding fish was developed. This technique involved using a block net draped across or along the wetted channel in an adjacent habitat unit such that part of the net would be submerged but the sides of the net would above the water (Figure 9). This allowed for a much larger area to hold fish while keeping them contained so that they could be released into the sampled unit when complete. We found this technique very easy to set up and less stressful to the captured fish. We would highly recommend this technique in scenarios where standard holding pens may get crowded.

Figure 9. Photo of temporary fish holding technique utilized by GDRCo in 2022 to increase volume of holding area. This one was used for 0+ fish and the blue hamper in the background was used for the three 1+ fish that were captured in the sampled unit.

Coordinating Research Efforts

Green Diamond maintains an open dialogue with various federal, state, and tribal agencies to avoid sampling redundancy whenever possible.

Acknowledgments

Several people contributed to the implementation and continued success of this monitoring project and are worthy of acknowledgement and recognition. First, thank you to the following individuals for their hard work, long hours and dedicated efforts conducting the field work: Erin Phillips, Jordan Spence, Lloyd Petrungaro and Lily Judevine. Thank you to Neil Cheatum for his continued efforts and technical support maintaining and enhancing our data management system. Last, but not least, thank you to both Matt Nannizzi and Pat Righter for their technical expertise, thoughtful input, and guidance during project implementation and review of this report.

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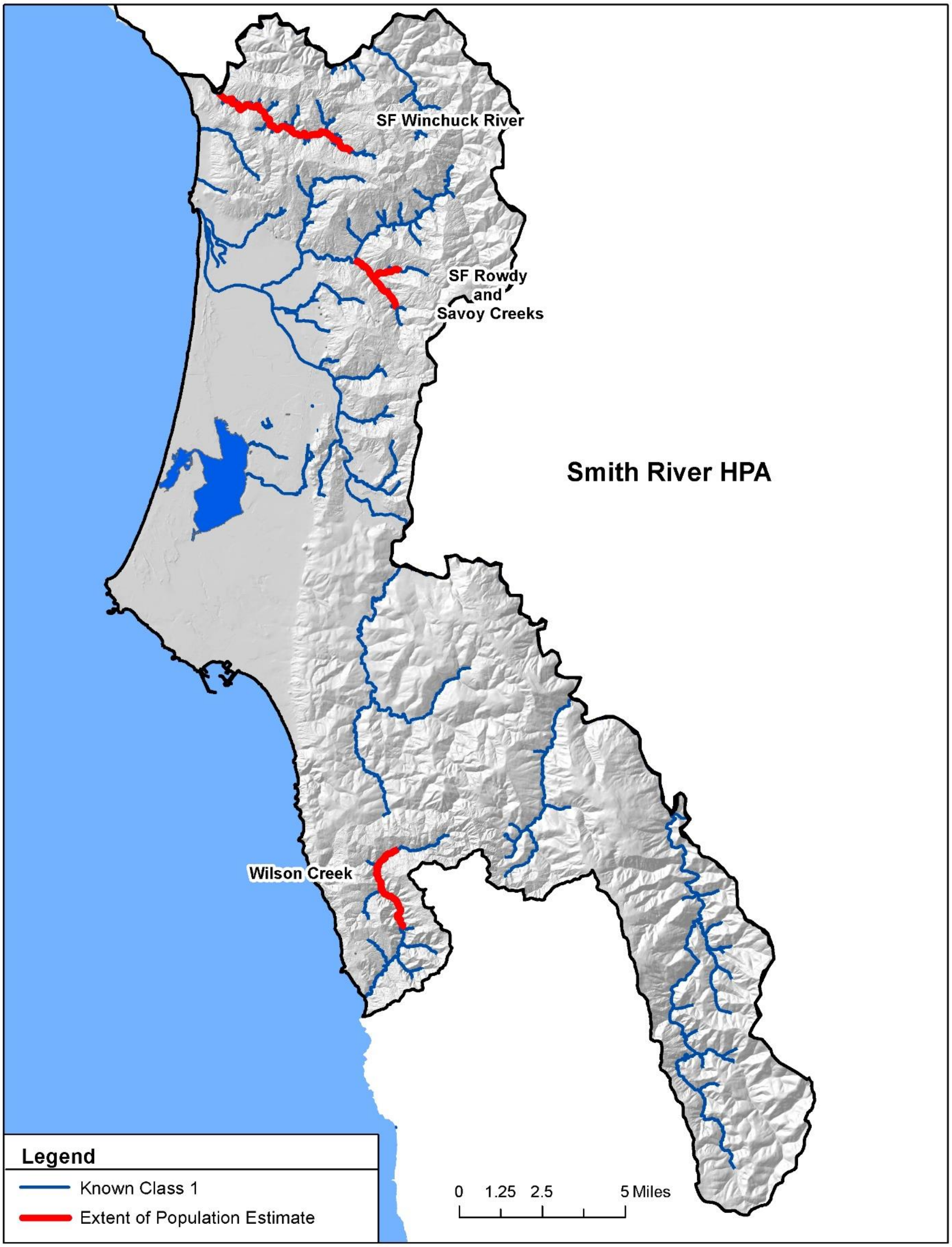
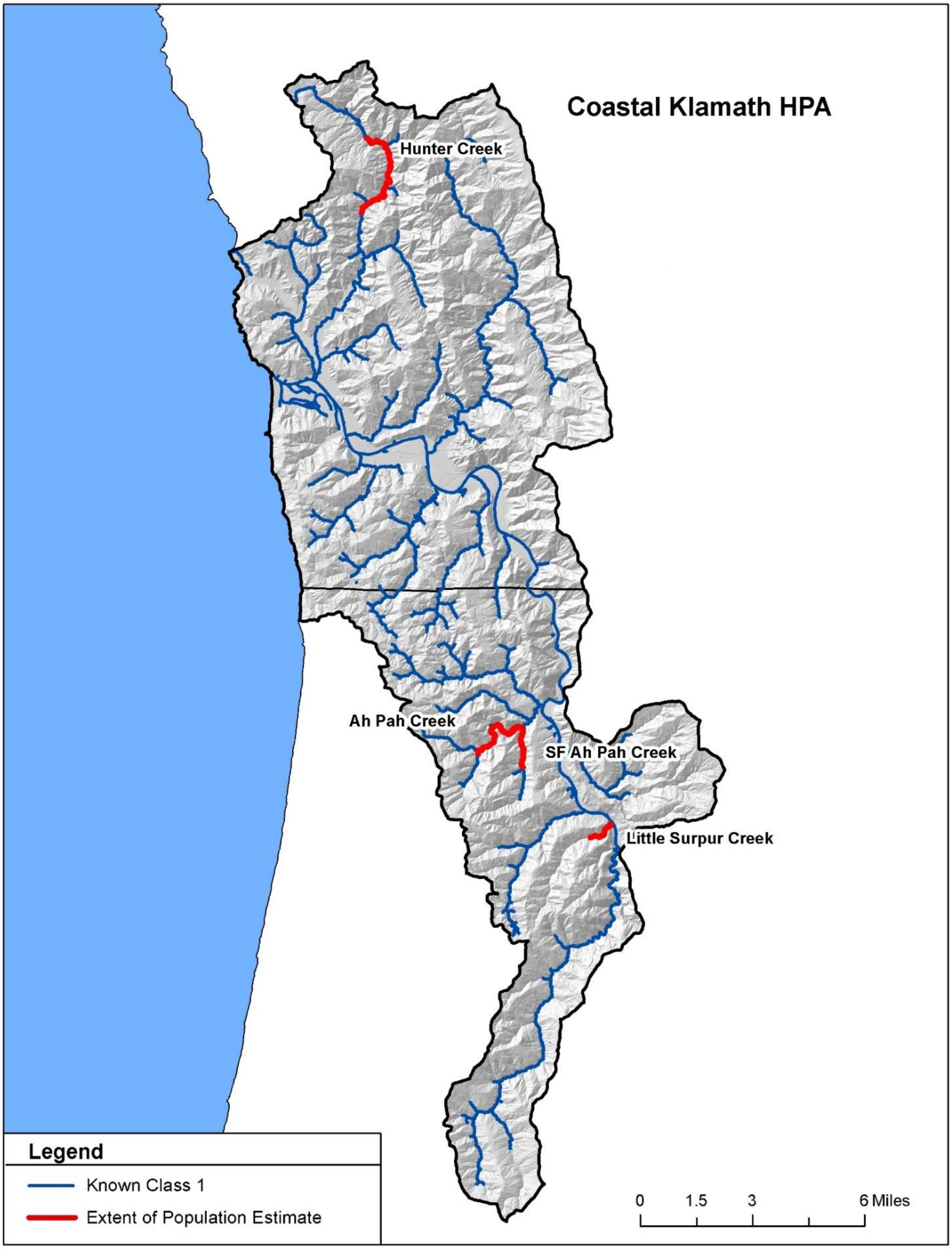
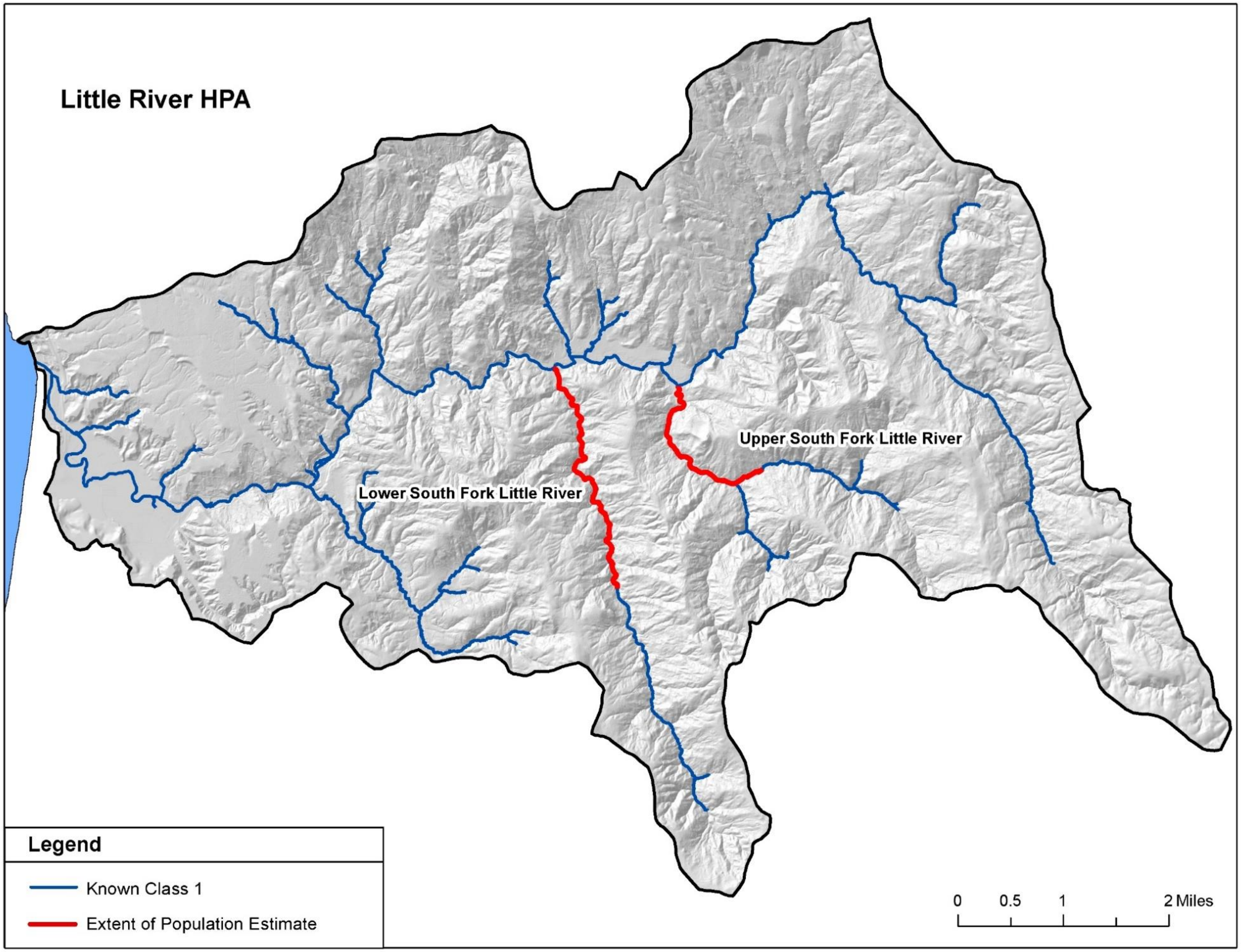
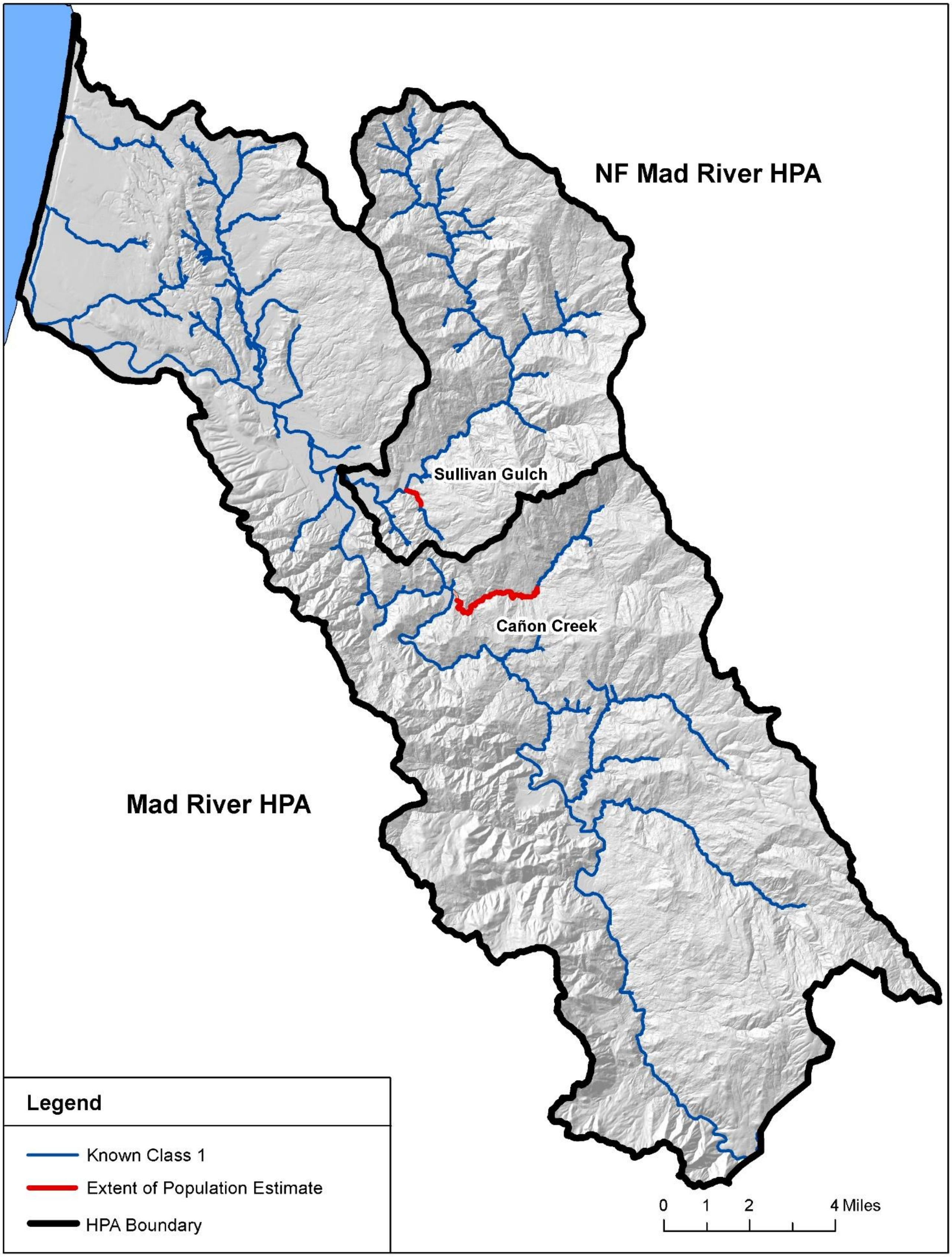
Appendices

Appendix 1. Maps showing the locations and extents of the sites monitored in 2022 to calculate summer juvenile salmonid population estimates. Sites were grouped by hydrographic planning area (HPA) and were ordered from north to south. The extent of each site was determined by evidence of coho anadromy and can vary in length from year to year.




Coastal Klamath HPA
Hunter Creek
Ah Pah Creek
SF Ah Pah Creek
Little Surpur Creek
Legend
Known Class 1
Extent of Population Estimate
0
1.5
3
6 Miles


Little River HPA
Upper South Fork Little River
Lower South Fork Little River
Legend
Known Class 1
Extent of Population Estimate
0
0.5
1
2 Miles


NF Mad River HPA
Sullivan Gulch
Cañon Creek
Mad River HPA
Legend
Known Class 1
Extent of Population Estimate
HPA Boundary
0 1 2 4 Miles

Appendix 2. Electrofishing equipment used by GDRCo fisheries staff during the 2022 summer juvenile population monitoring surveys.

During 2022, the GDRCo fisheries staff used two electrofishing units. Both electrofishers used were Smith-Root (Smith-Root Inc., Vancouver, WA) model LR-20B (serial #s: B24947 and B671241). The electrical input and output of these units as operated by GDRCo were as follows:

The Model LR-20B is a 400 watt electrofisher. It is capable of an output voltage of 50 to 990 volts. It was operated using DC current and 200 volts. The input from the 24-volt sealed lead acid battery or lithium ion battery system at up to 5 amps is capable of an output of up to 200 watts. Electrofishing with this model is conducted to keep the wattage output at approximately 100 watts or less. This was accomplished by monitoring the audible output voltage indicator (beeper). The rate of beeping is scaled to the wattage output, and if the rate increased indicating the 100-watt threshold was being broken, steps were taken to eliminate this from happening.

As mentioned above, sampling occurred with the use of straight DC current. The switch from pulsed DC to straight DC follows the NMFS recommended “decision tree”. This method of sampling coupled with our experienced fisheries staff reduced the chances of causing fish mortality. GDRCo has adopted the Hankin and Mohr (2001) salmonid population estimate sample design as a means of estimating coho populations and minimizes the use of electrofishing equipment. This protocol relies heavily on making multiple dive passes on Phase II shallow pools with low density population ($\leq$20 target species) rather than electrofishing every Phase II shallow pool. Only selected riffles and Phase II shallow pools with high density population (>20 target species) are sampled by electrofishing.

Appendix 3. Summary of summer juvenile salmonid population estimates, and confidence intervals (CI) separated by habitat type for each monitoring site sampled from 1995-2022.

		Coho Salmon				**Cutthroat Trout**				**Steelhead Trout**			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Ah Pah Creek	2007	378	238	1,542	380	22	6	217	106	80	22	367	201
	2008	265	90	3,001	642	5	4	212	111	17	15	443	157
	2009	323	186	1,525	433	5	5	501	310	40	8	380	112
	2010	218	210	440	212	43	27	645	409	49	14	202	87
	2011	890	675	696	223	50	28	371	275	200	85	302	220
	2012	447	393	983	274	64	40	292	122	80	14	284	94
	2013	250	139	1,557	634	66	16	583	217	77	38	462	188
	2014	14	13	125	74	135	77	571	249	53	15	158	57
	2015	0	0	135	126	8	0	436	148	22	8	91	76
	2016	107	94	889	186	41	13	285	121	61	33	245	53
	2017	76	72	168	99	9	9	100	86	84	30	338	165
	2018	204	244	54	46	18	22	222	100	56	53	500	198
	2019	6	8	81	51	4	3	151	57	20	6	475	111
	2020	2	4	0	0	113	130	279	110	63	56	412	155
	2021	56	46	490	235	63	22	234	120	75	24	456	184
	2022	260	205	1,530	927	42	34	318	133	12	10	260	183

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Cañon Creek	1995	319*	-	1,322	699	0	-	0	0	146*	-	1,019	263
	1996	0	0	0	0	12	12	0	0	409	123	281^	119†
	1997	23*	0	21	35	0	-	0	0	72*	-	531^	239†
	1999	279	129	203	122	0	0	0	0	219	53	392	128
	2000	170	55	126	45	16	12	13	21	361	79	598	106
	2001	1,046	161	816	195	0	0	0	0	362	79	416	209
	2002	655	187	490	246	4	6	0	0	222	58	163	84
	2003	34	23	31	51	0	0	0	0	199	80	289	204
	2004	1,567	308	1,025	289	0	0	0	0	312	80	405	131
	2005	277	88	354	117	0	0	0	0	177	50	289	117
	2006	15	16	0	0	0	0	0	0	291	97	227	54
	2007	1,796	521	660	219	0	0	0	0	124	27	330	140
	2008	740	180	515	245	3	3	0	0	119	40	194	135
	2009	0	0	0	0	0	0	0	0	191	38	305	115
	2010	271	151	58	12	0	0	0	0	252	69	309	114
	2011	436	142	121	57	0	0	0	0	265	49	387	202
	2012	538	214	45	19	21	17	22	11	340	67	430	221
	2013	286	262	195	135	0	0	0	0	155	61	207	111
	2014	640	319	551	144	0	0	0	0	175	41	210	122
	2015	30	16	44	43	0	0	0	0	182	69	201	69
	2016	288	128	379	114	0	0	0	0	80	24	167	55
	2017	403	134	210	63	0	0	0	0	258	62	298	82
	2018	529	386	183	80	0	0	0	0	320	107	352	80
	2019	324	326	0	0	0	0	0	0	136	49	375	128
	2020	201	156	62	107	0	0	0	0	212	53	257	144
	2021	244	134	214	132	0	0	0	0	148	48	152	61
	2022	533	197	833	297	0	0	0	0	124	44	355	167

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
EF Hunter Creek	2003	-	-	0	0	-	-	41	45	-	-	171	66
	2004	0	0	0	0	0	0	9	8	17	4	79	37
	2005	59	6	375	181	3	2	89	59	12	2	198	92
	2006	0	0	0	0	10	4	4	6	3	4	19	16
	2007	158	113	197	106	0	0	0	0	21	15	86	51
	2008	310	240	416	201	5	7	49	51	23	21	47	26
	2009	0	0	0	0	4	4	65	62	55	45	156	47
	2010	0	0	0	0	10	6	120	121	20	17	79	54
	2011	0	0	0	0	8	8	154	155	34	26	147	54
	2012	0	0	0	0	0	0	76	36	11	4	114	47
	2013	0	0	0	0	7	2	43	34	42	6	132	50
	2014	0	0	0	0	6	0	34	29	4	2	10	9
Heightman Creek	2005	-	-	908	349	-	-	4	7	-	-	19	10
	2007	-	-	361^	64	-	-	0	0	-	-	140	103
	2008	-	-	1,067	310	-	-	29	33	-	-	8	8
	2009	50	-	962	392	1	-	27	28	0	-	4	4
	2010	-	-	29	26	-	-	4	4	-	-	12	6
	2011	-	-	268	165	-	-	24	41	-	-	12	9
	2012	11	-	691	218	1	-	81	61	3	-	11	10
	2013	-	-	639	215	-	-	16	28	-	-	0	0
	2014	-	-	8	15	-	-	31	48	-	-	0	0

* Hard count, not estimate.

^ Combination of estimates and hard count.

\- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Hunter Creek	1998	331	134	82	88	0	0	18	30	1,101	421	839	303
	1999	0	0	0	0	0	0	0	0	128	44	754	134
	2000	0	0	0	0	35	26	10	15	902	319	1,268	382
	2001	148	84	847	264	0	0	29	34	302	95	1,138	313
	2002	1,231	362	1,327	355	4	6	137	101	286	90	712	193
	2003	518	224	1,104	298	8	9	83	101	248	82	948	258
	2004	150	40	163	94	12	8	232	124	338	62	764^	248†
	2005	3,196	1,346	2,743	750	9	6	117	94	249	54	734	187
	2006	466	217	239	191	218	54	5	3	218	54	395	114
	2007	3,075	1,181	1,457	376	4	6	0	0	289	86	945	306
	2008	1,918	763	779	304	2	3	18	16	80	31	163	80
	2009	694	360	963	543	85	47	312	168	830	385	1,555	496
	2010	152	86	84	22	23	14	54	46	223	63	327	89
	2011	1,074	556	702	431	154	96	218	102	628	249	1,006	611
	2012	243	156	67	68	12	7	75	51	306	172	839	602
	2013	218	161	213	121	20	13	159	81	533	255	561	149
	2014	2	3	0	0	6	6	23	13	189	98	316	119
	2015	35	22	79	38	23	12	42	20	337	127	281	110
	2016	24	18	26	24	10	8	8	9	106	50	94	41
	2017	11	9	0	0	26	18	8	10	402	109	256	160
	2018	34	38	8	10	85	40	110	57	233	143	298	149
	2019	29	16	41	43	25	26	78	53	93	74	262	158
	2020	0	0	0	0	27	10	155	148	266	103	659	257
	2021	0	0	0	0	176	101	310	157	460	182	545	200
	2022	400	133	556	124	15	15	164	179	368	133	610	250

* Hard count, not estimate.

^ Combination of estimates and hard count.

\- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Lower SF Little River	1998	3,086	395	1,224	502	0	0	0	0	169	59	58	35
	1999	2,390	356	6,066	880	0	0	74	63	54	21	154	54
	2000	1,819	325	3,284	591	4	7	21	18	23	20	74	38
	2001	339	123	589	239	6	7	0	0	83	25	48	19
	2002	3,484	511	10,838	2,234	10	9	132	89	57	17	177	106
	2003	1,816	309	4,504	1,060	0	0	74	46	32	20	47	34
	2004	986	213	3,186	1,171	14	9	11	19	38	15	155	101
	2005	1,996	211	4,916	866	13	11	57	44	51	15	125	51
	2006	1,796	245	7,989	1,546	0	0	47	27	8	6	113	160
	2007	1,097	139	6,846	1,043	0	0	42	28	55	25	104	59
	2008	1,720	317	8,650	1,993	0	0	31	21	23	17	48	60
	2009	1,983	452	7,954	3,292	8	9	96	94	36	20	116	96
	2010	766	169	1,244	319	31	10	43	33	82	17	64	30
	2011	2,851	726	5,741	979	47	20	190	71	53	15	213	75
	2012	3,656	1,108	7,260	2,086	37	18	177	99	101	36	208	85
	2013	2,378	765	7,118	1,462	65	28	151	69	138	45	223	78
	2014	575	138	557	165	69	26	226	150	102	33	72	28
	2015	2,002	639	5,560	1,532	18	13	95	59	46	20	123	79
	2016	1,715	257	5,128	1,189	28	12	110	65	57	19	95	89
	2017	805	205	2,901	625	26	8	94	52	63	17	139	79
	2018	747	248	8,417	2,488	26	19	103	55	68	24	406	132
	2019	1,276	409	3,176	842	26	17	95	53	21	12	73	59
	2020	1,389	712	6,370	2,026	24	18	15	19	90	32	201	61
	2021	2,522	923	8,516	2,101	15	13	37	30	105	48	101	101
	2022	930	280	13,772	2,799	42	21	758	520	70	31	91	64
Little Surpur Creek	2011	-	-	105	72	-	-	136	45	-	-	24	17
	2012	13	4	34	26	0	0	87	86	0	0	60	64
	2013	0	-	33	21	0	0	66	45	0	-	106	121
	2014	0	0	0	0	2	0	162	100	0	0	23	25
	2015	-	-	0	0	-	-	104	116	-	-	42	36
	2016	0	0	35	56	3	2	19	35	1	0	54	33
	2017	0	0	28	26	2	0	129	30	0	0	25	30
	2018	0	0	12	4	1	0	231	403	2	0	25	13
	2019	0	-	11	11	3	-	118	100	0	-	26	32
	2020	-	-	0	0	-	-	33	13	-	-	6	0
	2021	-	-	-	-	-	-	-	-	-	-	-	-
	2022	-	-	27	14	-	-	107	101	-	-	48	29
Moon Creek	2007	0	0	0	0	0	0	83	81	0	0	107	44
	2008	0	0	0	0	5	2	93	51	9	8	68	36
	2009	0	0	0	0	7	0	114	51	3	0	51	20
NF Ah Pah Creek	2007	-	-	139	103	-	-	11	19	-	-	12	12
	2008	-	-	809*	-	-	-	45*	-	-	-	42	35

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Railroad Creek	1998	85	48	165	98	0	0	9	13	90	55	88	52
	1999	0	0	391^	130†	0	0	2	5	12	9	63	23
	2000	40	62	155	86	3	4	0	0	19	8	80	40
	2001	0	0	7	17	2	3	0	0	10	8	60	31
	2002	67	104	1,472	517	0	0	25	47	27	5	66	68
	2003	28	40	251	106	0	0	4	7	8	3	28	32
	2004	0	0	0	0	0	0	0	0	19	8	45	28
	2005	147	37	514	189	17	13	16	19	25	24	31	23
	2006	0	0	153	83	0	0	4	6	3	5	23	20
	2007	18	25	144	63	0	0	0	0	18	5	44	50
	2008	0	0	95	79	0	0	10	19	34	26	22	11
	2009	0	0	24	20	4	4	3	5	17	10	51	35
	2010	0	0	0	0	0	0	12	23	6	3	11	4
	2011	0	-	0	0	4	-	9	13	4	-	37	13
	2012	0	-	0	0	1	-	48	46	3	-	91	79
	2013	0	-	0	0	3	-	17	10	2	-	10	6
	2014	0	0	0	0	14	2	0	0	5	2	2	4
SF Ah Pah Creek	2007	-	-	331	272	-	-	39	31	-	-	109	41
	2008	0	-	273	93	6	-	39	17	0	-	79	36
	2009	0	-	106	102	0	-	178	142	3	-	56	34
	2010	0	-	141	29	0	-	134	98	5	-	90	24
	2011	0	-	145	45	2	-	125	177	6	-	128	38
	2012	0	-	61	71	1	-	290	234	0	-	24	11
	2013	0	-	4	4	1	-	159	91	2	-	105	38
	2014	-	-	0	-	-	-	148	205	-	-	86	49
	2015	-	-	15^	23†	-	-	120	81	-	-	15	11
	2016	0	-	84	53	0	-	67	72	1	-	2*	-
	2017	0	-	0	0	2	-	175	77	0	-	18	13
	2018	0	-	133	121	0	-	107	97	4	-	238	125
	2019	0	-	0	0	1	-	105	200	2	-	266	61
	2020	-	-	0	0	-	-	144	87	-	-	82	38
	2021	-	-	0	0	-	-	128	32	-	-	48	33
	2022	-	-	64	47	-	-	87	70	-	-	108	73

* Hard count, not estimate.
^ Combination of estimates and hard count.
- Data unavailable.
† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
SF Rowdy / Savoy Creeks	2001	156	95	510	166	13	10	110	68	163	51	598	129
	2002	105	79	603	153	12	11	245	117	43	17	593	226
	2003	0	0	0	0	0	0	52	50	7	11	323	187
	2004	4	-	267	147	4	-	143	83	10	-	393	121
	2005	492	363	1,058	408	11	11	108	51	41	21	645	125
	2006	0	0	18	8	13	13	75	45	52	14	387	144
	2007	30	9	120	37	22	9	41	45	73	17	732	344
	2008	3	4	205	55	10	0	136	101	31	4	640	348
	2009	0	-	0	0	2	-	330	150	25	-	1,004	365
	2010	0	-	2	4	4	-	105	75	24	-	1,138	560
	2011	0	0	0	0	15	9	121	73	59	55	875	351
	2012	0	0	0	0	12	10	103	59	9	15	177	89
	2013	0	0	0	0	23	8	98	76	79	25	549	215
	2014	3	4	0	0	12	7	100	76	67	14	304	107
	2015	0	0	0	0	7	6	0	0	38	39	135	150
	2016	0	0	0	0	5	3	4	4	84	42	194	163
	2017	0	0	0	0	0	0	34	54	35	19	445	327
	2018	0	0	0	0	8	6	46	23	21	16	261	176
	2019	-	-	0	0	-	-	64	69	0	0	908	595
	2020	-	-	0	0	-	-	2	4	-	-	394	155
	2021	-	-	21	29	-	-	212	178	-	-	1,002	452
	2022	-	-	0	0	-	-	190	141	-	-	864	454

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
SF Winchuck River	1995	23*	-	32	47	29*	-	188	115	178*	-	1,149	501
	1996	28	21	4*	-	276	54	184	102	1,085	156	803	266
	1997	156*	-	317	140	56*	-	133	92	237*	-	619	280
	1998	33	7	0	0	261	71	191	92	1,480	224	1,067	260
	1999	0	0	0	0	110	32	255	65	325	76	756	102
	2000	0	0	0	0	154	50	479	214	1,291	232	1,809	361
	2001	7	8	13	23	257	50	378	90	1,041	135	1,392	200
	2002	392	87	656	148	136	39	328	142	660	136	677	160
	2003	62	38	126	87	208	36	435	91	637	115	1,042	222
	2004	2	3	8	4	62	21	309	74	121	39	777	136
	2005	220	95	589	181	123	50	597	163	344	42	1,300	229
	2006	2	2	8	14	171	41	474	180	272	58	976	298
	2007	115	54	294	76	149	38	284	77	280	60	622	135
	2008	107	51	77	38	212	35	395	182	636	95	600	142
	2009	2	3	0	0	195	48	388	183	292	42	776	206
	2010	41	26	22	15	251	47	624	176	603	95	1,363	259
	2011	13	14	5	3	195	24	673	273	664	88	1,476	298
	2012	2	3	0	0	189	31	314	156	199	61	676	303
	2013	0	0	0	0	307	106	288	213	1,263	386	687	227
	2014	311	179	92	81	297	47	460	192	680	148	1,051	272
	2015	2	2	0	0	84	21	292	100	264	78	663	185
	2016	0	0	0	0	83	34	186	98	311	35	748	142
	2017	0	0	0	0	156	29	308	80	611	104	983	230
	2018	76	72	84	52	151	45	368	107	490	169	1,099	242
	2019	2	2	0	0	67	20	170	98	602	161	951	240
	2020	88	50	220	100	67	24	283	119	199	51	830	191
	2021	3	5	415	239	42	18	209	121	335	127	1,072	328
	2022	8	9	2	4	68	18	316	133	360	87	1,561	494

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Sullivan Gulch	1999	168	37	627	287	0	0	0	0	9	4	5	7
	2000	13	-	42	40	0	-	0	0	4	-	60	29
	2001	23	-	843	387	0	-	0	0	2	-	73	59
	2002	151	-	2,429	454	0	-	0	0	4	-	6	10
	2003	88	84	1,343	590	0	0	0	0	3	3	19	17
	2004	28	-	1,084	309	0	-	0	0	3	-	40	24
	2005	26	-	394	114	0	-	0	0	0	-	37	29
	2006	-	-	393	154	-	-	0	0	-	-	6	11
	2007	27	-	1,100	587	0	-	0	0	0	-	10	12
	2008	6	-	1,246	985	0	-	0	0	0	-	16	20
	2009	0	-	50	29	0	-	0	0	2	-	27	17
	2010	0	0	0	0	0	0	0	0	5	3	0	0
	2011	77	-	198	98	0	-	0	0	0	-	6	5
	2012	2	-	0	0	0	-	0	0	0	-	6	8
	2013	2	-	0	0	0	-	0	0	0	-	7	10
	2014	0	-	39	22	0	-	0	0	0	-	2	3
	2015	0	-	4	4	0	-	0	0	0	-	4	5
	2016	12	2	21	20	0	0	0	0	1	0	7	13
	2017	5	-	89	32	0	-	0	0	3	-	50	54
	2018	2	-	27	29	0	-	0	0	0	-	0	0
	2019	22	4	28	43	0	0	0	0	4	3	0	0
	2020	29	4	133	42	0	0	0	0	7	3	12	5
	2021	0	0	97	26	0	0	0	0	0	0	12	8
	2022	65	-	1,005	504	0	0	0	0	0	0	2	3
Tarup Creek	2012	0	-	362	265	8	-	193	134	0	-	15	5
	2013	52	8	31	20	38	4	107	70	12	4	85	127
	2014	0	-	5	10	11	-	401	225	0	-	82	68

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Upper SF Little River	1998	303	117	517	230	21	29	4	5	108	30	208	64
	1999	257	193	1022^	489†	0	0	91	74	47	12	210^	73†
	2000	106	134	283	86	0	0	13	13	24	43	232	54
	2001	40	42	157	59	2	2	0	0	136	50	150	76
	2002	973	498	7,302	1,510	0	0	37	37	31	18	198	92
	2003	613	230	2,405	592	4	6	92	79	20	15	308	230
	2004	257	107	881	218	0	0	24	33	48	14	251	115
	2005	359	157	1,523	370	10	4	52	35	49	19	231	91
	2006	711	222	2,534	640	8	7	54	49	12	12	119	72
	2007	574	197	1,086	308	0	0	4	8	20	13	229	241
	2008	657	290	5,330	2,101	0	0	54	53	17	12	78	61
	2009	1,019	311	2,482	541	2	2	68	103	48	19	312	155
	2010	128	72	289	191	53	15	168	87	59	26	247	198
	2011	720	241	2,194	546	20	9	185	99	42	16	209	83
	2012	748	362	1,925	605	47	23	221	75	44	19	147	86
	2013	73	86	695	422	42	19	205	74	57	29	121	77
	2014	19	21	356	79	45	27	155	54	24	12	99	64
	2015	402	195	1,328	432	18	12	66	69	79	27	102	25
	2016	103	61	854	308	42	21	185	138	38	14	213	73
	2017	245	97	660	274	30	12	126	103	43	12	318	223
	2018	433	186	1,803	531	13	11	143	88	17	15	224	131
	2019	291	176	1,250	340	23	32	118	53	34	19	201	73
	2020	241	141	755	195	21	9	21	11	47	22	174	66
	2021	346	294	2,657	842	13	8	34	38	14	8	167	71
	2022	502	283	3,689	2,138	33	19	298	204	42	12	181	74

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix 3. Continued.

		Coho Salmon				Cutthroat Trout				Steelhead Trout			
		Deep Pools		Shallow Units		Deep Pools		Shallow Units		Deep Pools		Shallow Units	
Site Name	Year	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Wilson Creek	1995	237*	-	1,310	288	0	-	0	0	187*	-	908	302
	1996	442	159	173	158	136	57	6	19	1,086	247	1,093	383
	1997	248*	-	27*	-	0	-	0	0	125*	-	300^	76†
	1998	404	133	28	26	52	80	3	4	971	207	530	128
	1999	0	0	21	34	0	0	0	0	337	160	399	121
	2000	21	18	21	22	15	15	0	0	380	164	927	180
	2001	188	117	315	111	2	2	12	17	1,882	1,419	1,086	189
	2002	247	170	1,489	408	17	16	17	23	96	44	758	312
	2003	1,077	287	904	292	15	13	0	0	228	68	426	173
	2004	359	122	253	130	0	0	0	0	147	48	390	242
	2005	1,524	369	2,077	492	0	0	2*	-	230	86	535	152
	2006	204	55	347	136	4	6	0	0	318	136	465	148
	2007	3,023	783	1,836	385	5	4	0	0	184	63	306	140
	2008	3,928	851	6,918	2,008	0	0	4	7	85	27	463	163
	2009	0	0	0	0	13	7	17	19	82	30	758	533
	2010	705	389	1,138	516	11	10	0	0	390	141	1,210	512
	2011	2,938	1,035	4,835	1,565	30	15	31	16	465	75	1,397	347
	2012	72	32	108	24	50	22	26	11	678	222	358	303
	2013	457	156	519	329	31	15	40	28	600	194	660	395
	2014	797	396	571	338	15	16	15	21	202	69	288	173
	2015	17	17	0	0	11	13	0	0	708	238	552	270
	2016	1,792	582	1,616	785	7	7	0	0	239	77	474	237
	2017	1,075	225	1,042	364	36	17	4*	-	689	169	634	210
	2018	82	45	191	74	43	19	11	12	1,306	461	1,808	908
	2019	1,288	597	198	182	14	12	10	11	314	99	294	123
	2020	169	82	349	267	40	23	8	9	300	124	338	211
	2021	92	55	118	87	41	21	42	46	326	122	461	202
	2022	2,490	972	2,447	861	12	13	24	30	508	243	897	404

* Hard count, not estimate.

^ Combination of estimates and hard count.

- Data unavailable.

† Calculated from the product of available variances.

Appendix D

2022 Juvenile Salmonid Outmigrant Trapping Program, Little River- Annual Report to NMFS

Green Diamond Resource Company's Annual Report

To

National Marine Fisheries Service

For

Permit 17351-2R

Juvenile Salmonid Outmigrant Trapping Program

Little River

2022

Prepared by:

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Introduction

In 2022, Green Diamond Resource Company (GDRCo) conducted its twenty-fourth year of outmigrant smolt monitoring in Little River, under a National Marine Fisheries Service (NMFS) Section 10 Permit (17351-2R). This monitoring project has been conducted in Little River since 1999 and in 2007 became part of the Effectiveness Monitoring Program under an approved Aquatic Habitat Conservation Plan (AHCP, (GDRCo 2006)). The purpose of the Effectiveness Monitoring Program is to track the success of the AHCP conservation program in relation to the biological goals and objectives and provide a basis for adaptive management.

The Little River watershed is in Humboldt County, California and provides habitat for ESA listed salmonids from the Southern Oregon/North Coastal California (SONCC) coho salmon evolutionarily significant unit (ESU), California Coastal Chinook salmon ESU, and Northern California steelhead distinct population segment (DPS). The objectives of the outmigrant trapping project in the Little River watershed are to monitor the abundance, size and timing of emigrating salmonid smolts for these species and coastal cutthroat trout. Over time, the results of this monitoring effort will provide information on long-term trends in any of these variables. Comparisons of the outmigrant population estimate to a summer population estimate (where available) can also be made to yield an apparent overwinter survival rate for the juvenile coho population. Juvenile outmigrant trapping helps to identify factors affecting outmigration timing, and establish baseline and long-term trend data on the abundance of juvenile salmonid populations.

Outmigrant trapping was conducted in Little River from February 23rd through July1st, 2022. This document reports findings for the 2022 season and makes comparisons to past monitoring in Little River.

Methods

Study Site

Outmigrant trapping was conducted at four sites in the Little River watershed (Figure 1). Traps were operated on Lower South Fork Little River (LSFLR, drainage area ≈ 5.31 mi^2), Upper South Fork Little River (USFLR, ≈ 5.70 mi^2), Carson Creek (CC, ≈ 3.81 mi^2) and Mainstem Little River (MSLR, ≈ 40.35 mi^2). There is approximately 3.0, 2.0, 3.5, and 21.4 miles of known coho habitat above these sites, respectively. However, the amount of habitat above each monitoring site varies from year to year, as a result of dynamic stream processes. All tributary trap sites are located near the confluence of each creek with mainstem Little River. The mainstem site (MSLR) was established in 2015 at approximately river mile three and is downstream of the tributary sites. These creeks are all located within the Little River hydrographic planning area (HPA, (GDRCo 2006)) and lands within each monitored sub-basin are entirely or predominantly owned by GDRCo.

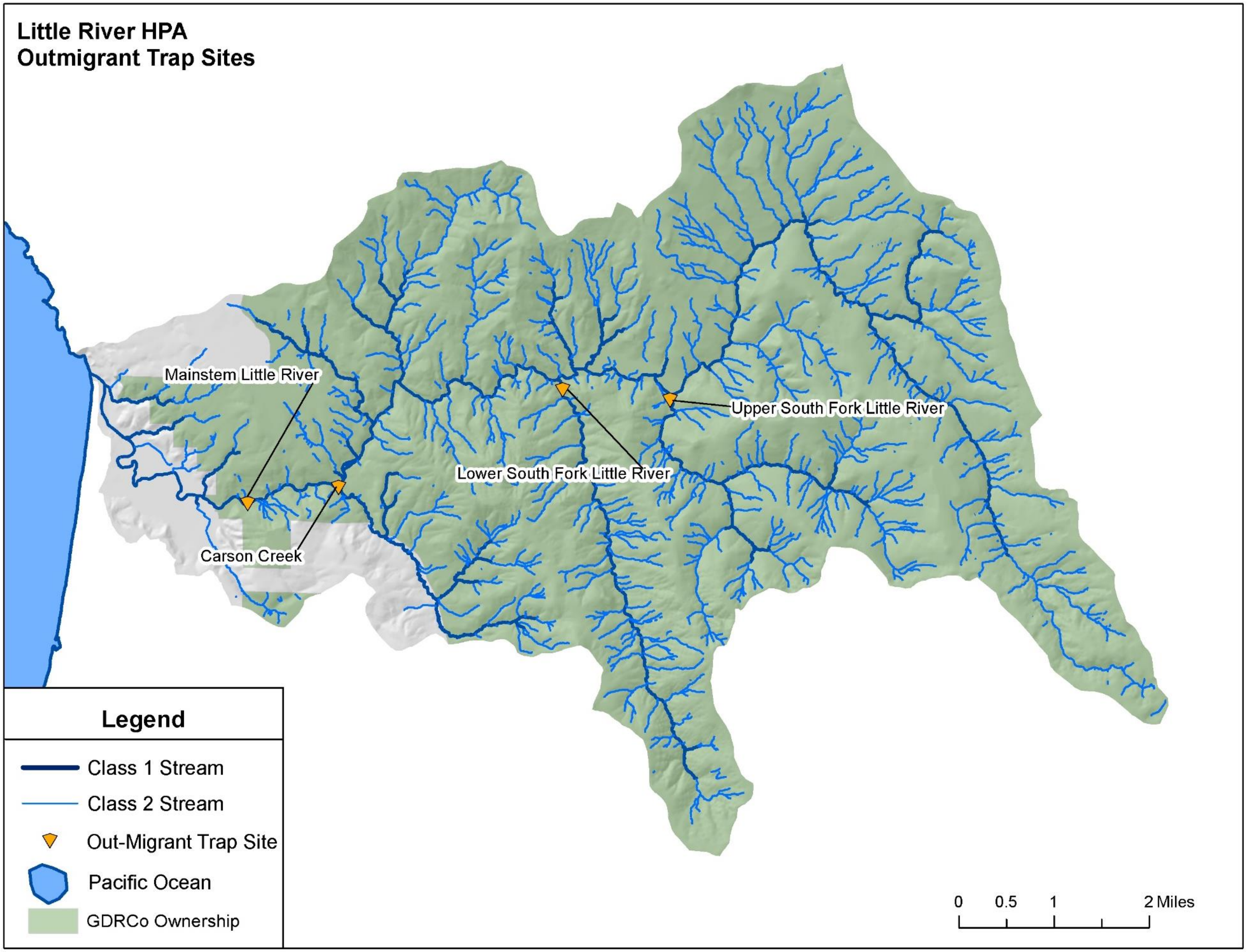

Figure 1. Location of the four outmigrant trap sites within the Little River Hydrographic Planning Area, Humboldt County, California.

Outmigrant Trapping

Two types of outmigrant traps were used for monitoring in Little River. V-notch weir/pipe traps (Figure 2A) are utilized at the tributary sites and a rotary screw trap (RST; Figure 2B) at the mainstem site. Two methods were used because stream habitat conditions are different between mainstem and tributary sites and each method is the best available technique where it was used. Details on each of these trapping methods are below.

The RST (cone diameter = 1.5 m) is made up of seven general components; a screened cone, two pontoons, cross members, two live-boxes, A-frame, rails and weir(s). The trap was positioned in the creek with the opening of the cone facing upstream and was located at the head of a pool utilizing the upstream riffle to spin the cone. Under low flows, weir(s) were installed upstream from the trap opening to help guide out-migrating fish into the trap and capture more water to increase cone rotation. Rotations per minute (RPM) were counted during site visits. The weir(s) was constructed of sandbags and rocks which are removed after the trapping season. Fish entering the cone were guided by an auger inside the cone into a live-box (dimensions = 56" L X 40" W X 20" D) at the rear of the trap. An additional back box was added to increase the capacity of the trap. Screened openings (mesh opening size =1/2", set diagonally) were provided in the sides or back of the live-boxes to minimize the predation potential by allowing smaller fish to exit the live-boxes. Exclusion tubes were placed in both live-boxes to help minimize predation potential of YOY fish. These tubes (1/2" sq. plastic coated wire mesh, set diagonally, dimensions = 12" L X 9.5" W) were positioned vertically in the water and used to provide refuge for juveniles.

The V-notch weir/pipe trap method uses a combination of a weir, pipe, McBane's ramp, and live-box. The weirs were constructed with fence posts and wooden pallets and buttressed with large substrates (e.g., cobbles and boulders). A weir overflow was constructed to provide passage for adult migrants moving upstream to spawn. The pipe runs from the center of the “V” in the weir and empties out onto a McBain’s ramp that dissipates water velocity of the outflow and guides fish into the trap box. Inside the trap, a V-shaped panel creates a large slack water area in the box. The slack water area provides a place where fish are protected from the current of the stream. Mesh screen (mesh size opening = ½”) at the back of the live box allowed YOY fish to escape the trap. To prevent predation, cobbles and a circular mesh enclosure (mesh size = ½”) was provided to serve as refuge for YOY fish.

Outmigrant traps were operated 24 hours a day, 7 days a week during suitable flow condition and checked at least daily. During large storm events, trapping was suspended to prevent fish mortality and equipment damage. During periods when significant numbers of outmigrants were captured or when accumulations of debris were likely (e.g. during moderate-high winds), the traps were checked more than once per day, as necessary. The reason being that juvenile salmonid mortality has been associated with large capture numbers and debris loading in the trap-box during periods of high winds and high flows (GDRCo 2011).

Figure 2. Photos showing the trapping methods, V-notch weir/pipe trap (A) and RST (B), used for outmigrant trapping in Little River, Humboldt County, California.

The data collecting and handling procedures for captured fish varied depending on species and age class. Each day, all captured fish were at least identified, aged, and counted. Due to the similarities between YOY steelhead and YOY cutthroat trout, proper identification is problematic (Baumsteiger et al. 2005, Voight et al. 2008), therefore, these species were categorized as "trout". All "trout" were YOY fish. Steelhead and cutthroat trout in the 1+ or older age classes are more readily distinguishable and were categorized to species. Adult cutthroat were defined as fish >200 mm with little to no signs of smoltification. Among YOY salmonids captured each day, the first 20 fish of each species at each site were measured (fork length [FL], ± 1 mm). Weights (± 0.1 gram) were also collected for the measured fish one day per week at each site. Among 1+ fish and adult cutthroat captured each day, the first 20 fish of each species were measured and weighed at each site. Adult steelhead were measured, when feasible, but not weighed. Unmarked fish were released downstream from the trap site after processing and handling. Among smolts, a sub-sample were marked and released upstream of the trap to estimate trapping efficiency (see below for details). Prior to marking, fish were identified, anesthetized with Alka-Seltzer Gold®, weighed, and measured. After recovery, marked fish were released upstream of the weir to quantify trap efficiency.

Trap Efficiency

Trap efficiency was calculated only for species that were actively leaving the watershed on their seaward migration (i.e., smolts). Smolts were identified using distinct morphological characteristics including; fading parr marks, scale color transition towards silver, and fins turning clear with dark tips. At MSLR, four different caudal fin clips were used as marks throughout the trapping effort on a seven-day rotating period: upper horizontal, upper vertical, lower vertical, and lower horizontal. After the first twenty-eight days, the same sequence of clips was repeated. At the tributary trap sites, PIT tags were implanted in the abdomen, posterior to the pectoral fin. This allowed for unique identification among individuals and tracking recaptures between sites to avoid pseudoreplication in the data. Fish that were captured at MSLR with a PIT tag were tallied as unmarked fish for the MSLR site. Up to 20 smolts of each species were marked every day for trap efficiency tests.

Marked fish were allowed to recover in a perforated live-box that was located at least three pool habitats upstream of each trap site. The live-box has an automatic release device which was programmed to release fish 10 hours following capture. This delayed release allowed fish ample recovery time and provided cover (i.e., darkness) during their release to minimize predation. Recaptured fish were released downstream from the trap site to avoid pseudoreplication in calculations of capture probabilities.

Population Estimates

All outmigrant salmonid smolt population estimates were calculated using the Darroch Analysis with Rank Reduction (DARR 2.0.1 software) for analysis of stratified mark-recapture data (Bjorkstedt 2005) where possible. Due to low capture or recapture numbers, or other circumstances, it was not possible to generate population estimates for all species and years. In these cases, only counts are shown and these data are labeled in tables and depicted without error bars in figures.

While all historical data have been audited for accuracy and consistency as for this report, GDRCo maintains and periodically updates a data quality routine that may detect previously unidentified errors. Estimates presented in this report that differ from previously reported figures should be considered the most accurate.

Coho Overwinter Survival

The apparent overwinter survival of coho salmon was calculated by dividing the smolt population estimate by the prior summer's juvenile population estimate. Summer juvenile population estimates were conducted using the GDRCo Single Stream Population Estimate protocol (GDRCo 2021). Summer coho population estimates presented here are for use in estimating apparent overwinter survival and were generated using the Mohr and

Hankin (2005) estimators of abundance and variance with bias adjustments to reduce the bias of the bounded counts and jackknife estimators.

One assumption for this method of calculation is that the monitored population is closed. However, recent work in Freshwater Creek, a nearby coastal watershed, quantified the probability of early emigration of coho smolts and found that 2-25% of them emigrate during late fall and winter (Rebenack et al. 2015). This finding must be considered when interpreting the overwinter survival estimated for Little River.

An overwinter survival estimate could not be calculated for Carson Creek or Mainstem Little River because site conditions prohibit use of the standard GDRCo Juvenile Summer Abundance survey protocol. Carson Creek has dark tannic water and an abundance of complex deep pools with large woody debris that are very difficult to dive or electrofish effectively and Mainstem Little River is too large and extensive to effectively sample.

Stream Temperature

Water temperature was monitored at each site during the 2022 trapping season and these data were used to document the water temperatures trapped fish were exposed to during the monitoring season. Water temperatures were measured using HOBO® Water Temp Pro v² data loggers (Onset Computer Corporation, Bourne, MA). At the tributary traps data loggers were attached to the bottom of a t-post installed adjacent to the trap box. At the mainstem trap, the data logger was attached directly to the frame of the live box. Loggers recorded water temperature (ºC) on a 72 minute interval.

Results

Trapping Effort

The 2022 trapping effort was summarized and compiled with all other years to allow for comparison over the history of outmigrant trapping in the Little River watershed (Table 1). In 2022, outmigrant traps were in operation for 89.7% of the trapping season. The overall mean of operable days across all years and sites is 94.7%. For the mainstem RST, the initiation of trapping on February 23rd was 26 days earlier than the mean initiation date of March 21st. For the Carson Creek trap, the initiation of trapping on April 8th was 13 days later than the mean initiation date of March 26th. For the LSFLR trap, the initiation of trapping on April 9th was 15 days later than the mean initiation date of March 25th. For the USFLR trap site, the initiation of trapping on May 4th was 39 days later than the mean initiation date of March 26th. A histogram with combined tributary estimates (primary y-axis) and average tributary trap installation date (secondary y-axis) illustrates the increasingly later trap installation trend in recent years (Figure 3). At MSLR, cone revolutions (rpm) were counted for 100% of trapping days (average = 5.8 rpm, range = 1.25-11.25).

Table 1. Summary of the 1999 – 2022 outmigrant trapping (OMT) seasons conducted by GDRCo in the Little River watershed, Humboldt County, California.

		Year																									
Site	**OMT parameter**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Mean**	**Total**
MSLR	Initiation date	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28-Mar	2-Apr	22-Apr	31-Mar	14-Mar	28-Feb	16-Mar	23-Feb	21-Mar	-
	Completion date	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19-Jun	24-Jun	30-Jun	29-Jun	5-Jul	26-Jun	25-Jun	1-Jul	27-Jun	-
	Season days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	84	70	91	114	120	102	129	99.3	794
	Operable days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82	84	69	80	106	114	102	118	94.4	755
	Operable %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98%	100%	99%	88%	93%	95%	100%	91%	96.0%	-
	Inoperable days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	1	11	8	9	0	10	5.1	41
	Inoperable %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2%	0%	1%	12%	7%	8%	0%	8%	4.3%	-
CC	Initiation date	-	31-Mar	19-Feb	19-Feb	3-Mar	11-Mar	25-Feb	6-Apr	15-Mar	12-Mar	26-Mar	29-Mar	9-Apr	14-Apr	23-Mar	22-Mar	28-Mar	2-Apr	5-May	27-Apr	27-Apr	21-Mar	3-Apr	8-Apr	26-Mar	-
	Completion date	-	16-Jun	5-Jun	5-Jun	11-Jun	28-May	3-Jun	14-Jun	21-Jun	26-Jun	19-Jun	29-Jun	18-Jun	29-Jun	28-Jun	14-Jun	12-Jun	17-Jun	22-Jun	11-Jun	24-Jun	19-Jun	5-Jun	13-Jun	15-Jun	-
	Season days	-	78	107	107	101	79	99	70	99	107	86	93	71	77	98	85	77	77	49	46	62	91	70	66	82.4	1895
	Operable days	-	78	107	107	87	75	86	68	98	107	84	86	67	77	98	83	76	77	49	46	59	89	70	56	79.6	1830
	Operable %	-	100%	100%	100%	86%	95%	87%	97%	99%	100%	98%	92%	94%	100%	100%	98%	99%	100%	100%	100%	95%	98%	100%	85%	97.2%	-
	Inoperable days	-	0	0	0	14	4	13	2	1	0	2	7	4	0	0	2	1	0	0	0	4	1	0	10	2.8	65
	Inoperable %	-	0%	0%	0%	14%	5%	13%	3%	1%	0%	2%	8%	6%	0%	0%	2%	1%	0%	0%	0%	6%	1%	0%	15%	2.8%	-
LSFLR	Initiation date	17-Mar	7-Mar	21-Feb	19-Feb	3-Mar	11-Mar	25-Feb	7-Apr	15-Mar	12-Mar	2-Apr	29-Mar	9-Apr	14-Apr	23-Mar	22-Mar	28-Mar	2-Apr	5-May	27-Apr	27-Apr	21-Mar	3-Apr	9-Apr	25-Mar	-
	Completion date	7-Jul	16-Jun	4-Jun	5-Jun	11-Jun	28-May	3-Jun	14-Jun	21-Jun	19-Jun	19-Jun	29-Jun	18-Jun	15-Jun	21-Jun	14-Jun	5-Jun	17-Jun	22-Jun	21-Jun	17-Jun	19-Jun	5-Jun	13-Jun	15-Jun	-
	Season days	113	102	104	107	101	79	99	69	99	100	79	93	71	63	91	85	70	77	49	56	52	91	70	65	82.7	1985
	Operable days	105	102	100	107	77	78	43	69	97	100	76	82	67	63	91	82	69	77	49	56	49	89	69	55	77.2	1852
	Operable %	93%	100%	96%	100%	76%	99%	43%	100%	98%	100%	96%	88%	94%	100%	100%	96%	99%	100%	100%	100%	94%	98%	99%	85%	94.3%	-
	Inoperable days	8	0	4	0	24	1	56	0	2	0	3	11	4	0	0	3	1	0	0	0	4	2	1	10	5.6	134
	Inoperable %	7%	0%	4%	0%	24%	1%	57%	0%	2%	0%	4%	12%	6%	0%	0%	4%	1%	0%	0%	0%	8%	2%	1%	15%	5.7%	-
USFLR	Initiation date	16-Mar	4-Mar	28-Feb	19-Feb	3-Mar	11-Mar	25-Feb	11-Apr	15-Mar	12-Mar	2-Apr	29-Mar	9-Apr	14-Apr	23-Mar	22-Mar	28-Mar	2-Apr	5-May	27-Apr	27-Apr	21-Mar	3-Apr	4-May	26-Mar	-
	Completion date	7-Jul	14-Jun	4-Jun	31-May	11-Jun	28-May	3-Jun	7-Jun	14-Jun	12-Jun	19-Jun	8-Jun	11-Jun	29-Jun	21-Jun	7-Jun	5-Jun	10-Jun	15-Jun	11-Jun	17-Jun	19-Jun	5-Jun	13-Jun	12-Jun	-
	Season days	114	103	97	102	101	79	99	58	92	93	79	72	64	77	91	78	70	70	42	46	52	91	70	40	78.3	1880
	Operable days	108	103	97	102	76	78	39	57	91	93	76	66	60	77	91	76	69	70	42	46	48	89	70	40	73.5	1764
	Operable %	95%	100%	100%	100%	75%	99%	39%	98%	99%	100%	96%	92%	94%	100%	100%	97%	99%	100%	100%	100%	92%	98%	100%	100%	94.5%	-
	Inoperable days	6	0	0	0	25	1	60	1	1	0	3	6	4	0	0	2	1	0	0	0	5	2	0	0	4.9	117
	Inoperable %	5%	0%	0%	0%	25%	1%	61%	2%	1%	0%	4%	8%	6%	0%	0%	3%	1%	0%	0%	0%	10%	2%	0%	0%	5.6%	-
Total	Average install date	16-Mar	14-Mar	22-Feb	19-Feb	3-Mar	11-Mar	25-Feb	8-Apr	15-Mar	12-Mar	30-Mar	29-Mar	9-Apr	14-Apr	23-Mar	22-Mar	28-Mar	2-Apr	5-May	27-Apr	27-Apr	21-Mar	3-Apr	17-Apr	26-Mar	
Total	Season days	227	283	308	316	303	237	297	197	290	300	244	258	206	217	280	248	301	308	210	239	280	393	312	300	343	6554
Total	Operable days	213	283	304	316	240	231	168	194	286	300	236	234	194	217	280	241	296	308	209	228	262	381	311	269	325	6201
Total	Inoperable days	14	0	4	0	63	6	129	3	4	0	8	24	12	0	0	7	5	0	1	11	21	14	1	30	18	357
Mean	Season days	114	94	103	105	101	79	99	66	97	100	81	86	69	72	93	83	75	77	53	60	70	98	78	75	86	1639
Mean	Operable days	107	94	101	105	80	77	56	65	95	100	79	78	65	72	93	80	74	77	52	57	66	95	78	67	81	1550
Mean	Inoperable days	7	0	1.33333	0	21	2	43	1	1.33333	0	2.66667	8	4	0	0	2	1	0	0	3	5	4	0	8	4.6	89
Mean	Operable %	93.83%	100.00%	98.70%	100.00%	79.21%	97.47%	56.57%	98.48%	98.62%	100.00%	96.72%	90.70%	94.17%	100.00%	100.00%	97.18%	98.34%	100.00%	99.52%	95.40%	93.57%	96.95%	99.68%	89.67%	94.73%	94.61%
Mean	Inoperable %	6.17%	0.00%	1.30%	0.00%	20.79%	2.53%	43.43%	1.52%	1.38%	0.00%	3.28%	9.30%	5.83%	0.00%	0.00%	2.82%	1.66%	0.00%	0.48%	4.60%	7.50%	3.56%	0.32%	10.00%	5.37%	5.45%

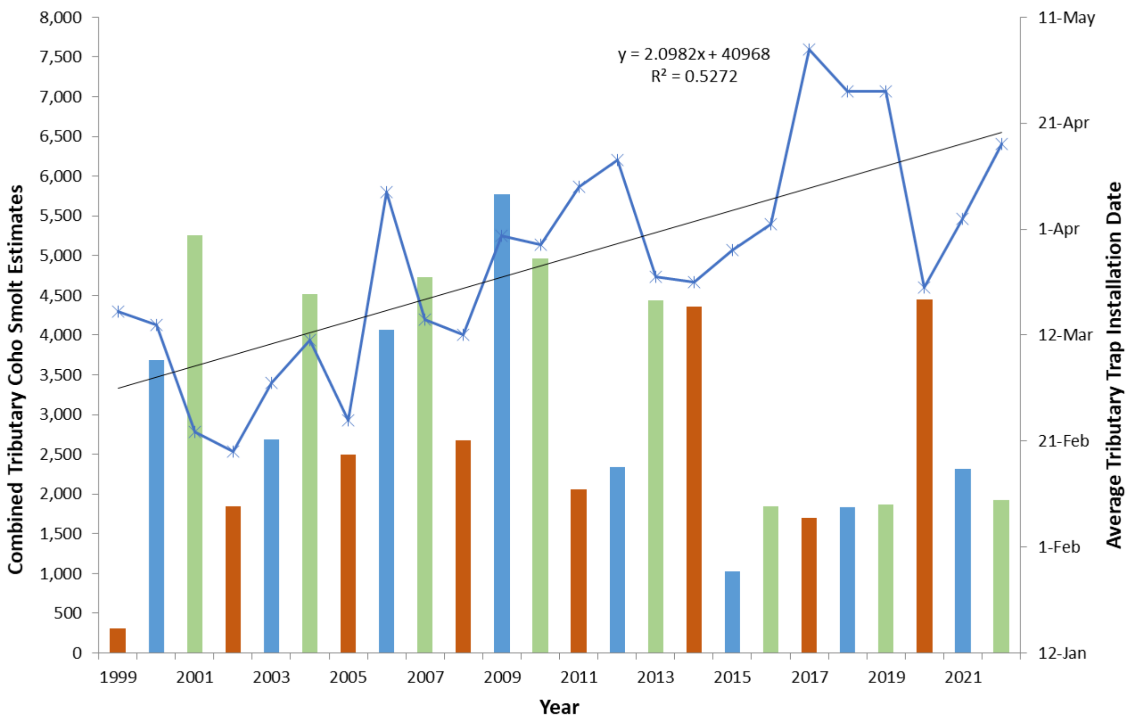

Figure 3. Frequency histrogram of combined tributary coho estimates (colored bars, y-axis) with colored bars indicating three distinct cohorts of coho and average tributary trap installation date (blue line, secondary y-axis). Trend line is for the trap installation date, indicating later initiation dates over time.

Trap Efficiency

Trapping efficiencies (i.e., capture probability) were calculated for coho smolts at each of the four trap sites. Efficiencies were also calculated for steelhead and cutthroat smolts at MSLR. When efficiencies were not calculated it was due to insufficient captures or recaptures. The change in trapping efficiency varied both among sites and during the season (Figure 4). The overall mean trap efficiency for coho smolts during the 2022 trapping season was 52% (Range = 12− 93%). Compared to past years, average trap efficiency in 2022 was within the range previously documented (42 − 76%) in Little River.

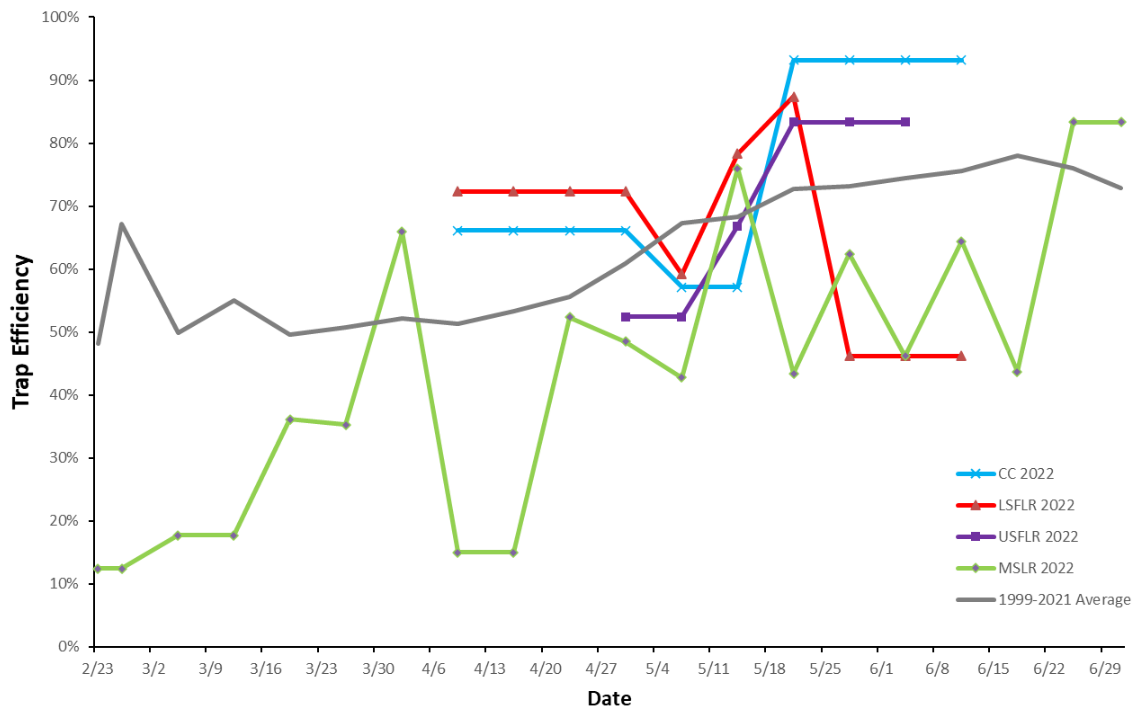

Figure 4. Summary of trap efficiencies for coho smolts during 2022 outmigrant trapping and the average of all four trapping sites for 1999-2021 in Little River, Humboldt County, California.

Population Estimates

During the 2022 outmigrant trapping season, a total of 9,636 salmonid smolts were captured. The number of captures (i.e., marked and unmarked fish), marked, and recaptured fish for each species were summarized (Table 2). Coho accounted for most (97%) of the smolt captures. Among the salmonid smolts captured, 31% were marked. The proportion of marked smolts by species at all trapping sites was; 29% for coho, 92% for steelhead, and 100% for cutthroat. The relatively high proportion of marked steelhead and cutthroat resulted from small sample sizes. In 2022, smolt population estimates were calculated for all salmonids at each monitoring site where possible (Table 3) and compared to the previous years' estimates (Figures 5-7).

Smolt estimates for coho, steelhead and cutthroat were variable among sites and there has not been a consistent pattern over time. Coho smolt estimates were highest at MSLR followed by LSFLR, CC and USFLR (Figure 5). Compared to 2021, coho estimates increased at MSLR and CC outmigrant trap sites and decreased at LSFLR and USFLR in 2022.

The 2022 estimate at MSLR was the third time this cohort (i.e., Figure 5, green bar) was estimated. Compared to 2019, coho smolt estimates increased by approximately 54%.

The 2022 estimates from the tributaries were below average for LSFLR (mean=1,328), CC (mean = 1,394) and USFLR (mean=436).

For the tributary traps, steelhead smolt numbers were similarly low among sites in 2022, and were either absent or extremely low (Figure 6). Cutthroat smolts were absent at the tributary sites and only present at MSLR (Figure 7). Estimates for cutthroat and steelhead smolts at MSLR increased from 2021. Estimates for both coho and steelhead smolts at MSLR for 2022 were the highest estimates on record for those species. Cutthroat smolt estimates at MSLR were the second highest (74) at MSLR after a record low (4) in 2021.

Excluding smolts, a total of 6,914 salmonids were captured at the four sites in Little River during the 2022 trapping season. These captures were summarized by site for each species and age class (Table 4). The numbers in this table are counts and not estimates. A majority (82%) of the captures were 1+ fish, followed by 0+ fish (17%), and adults (1%).

Counts of cutthroat 1+ and steelhead 1+ moving through the outmigrant traps from 1999-2022 are presented below (Figure 8). Trap efficiencies were not calculated for cutthroat 1+ and steelhead 1+. During the 2022 trapping season a total of 1,518 cutthroat 1+ and 4,128 steelhead 1+ were captured at the 4 trapping sites in Little River. Total captures for steelhead 1+ increased significantly beginning in 2015 with the initiation of the MSLR site.

Table 2. Summary of the 2022 smolt captures and recaptures during the outmigrant trapping season in the Little River watershed, Humboldt County, California.

	Captured Smolts			Marked Smolts			Recaptured Smolts		
Site	**Coho**	**Steelhead**	**Cutthroat**	**Coho**	**Steelhead**	**Cutthroat**	**Coho**	**Steelhead**	**Cutthroat**
MSLR	7,998	264	19	1,731	243	19	792	70	6
CC	335	1	0	298	1	0	213	0	0
LSFLR	874	1	0	512	1	0	374	1	0
USFLR	144	0	0	141	0	0	91	0	0
Total	9,351	266	19	2,682	245	19	1,470	71	6

Table 3. Smolt population estimates and confidence intervals (UCI = upper and LCI = lower) from outmigrant trapping 1999-2022 in the Little River watershed, Humboldt County, California.

		MSLR			CC			LSFLR			USFLR		
Species	**Year**	**Estimate**	**95% UCI**	**95% LCI**	**Estimate**	**95% UCI**	**95% LCI**	**Estimate**	**95% UCI**	**95% LCI**	**Estimate**	**95% UCI**	**95% LCI**
Coho	1999	-	-	-	-	-	-	287	39	39	25	8	8
	2000	-	-	-	1,832	64	64	1,718	121	121	137	13	13
	2001	-	-	-	2,331	42	42	2,832	568	568	89	16	16
	2002	-	-	-	1,264	153	153	549	60	60	30	8	7
	2003	-	-	-	1,112	104	104	950	483	466	621	157	157
	2004	-	-	-	2,181	155	155	1,411	109	109	927	904	793
	2005	-	-	-	1,519	126	126	873	138	138	100	8	8
	2006	-	-	-	2,625	430	430	1,039	57	57	404	39	39
	2007	-	-	-	2,293	200	200	1,721	223	223	719	282	282
	2008	-	-	-	1,164	22	22	1,156	43	43	354	45	45
	2009	-	-	-	2,118	43	43	2,372	128	128	1,282	219	219
	2010	-	-	-	2,241	318	318	1,283	308	308	1,439	502	502
	2011	-	-	-	729	127	127	1,130	149	149	198	96	96
	2012	-	-	-	1,002	155	155	998	277	277	338	73	73
	2013	-	-	-	1,806	28	28	1,966	228	228	670	105	105
	2014	-	-	-	1,718	78	78	2,405	366	366	240	14	14
	2015	2,557	90	90	427	5	5	454	168	168	146	30	30
	2016	5,036	266	266	876	62	62	691	37	37	283	118	118
	2017	8,195	859	859	583	50	50	934	102	102	185	102	88
	2018	5,056	692	692	319	89	89	1,253	567	567	267	187	187
	2019	9,609	1,161	1,161	635	18	18	794	30	30	442	71	71
	2020	13,441	1,456	1,456	1582	126	126	2,030	425	425	831	61	61
	2021	6,164	445	445	320	27	27	1,702	213	213	296	46	46
	2022	17,843	1,325	1,325	502	39	39	1,169	61	61	250	65	65
Steelhead	1999	-	-	-	-	-	-	101	52	52	50	14	14
	2000	-	-	-	12	6	5	61	15	15	76	8	8
	2001	-	-	-	23	2	2	36	16	16	51	11	11
	2002	-	-	-	93	23	23	41	21	21	53	9	9
	2003	-	-	-	61	59	47	50	38	34	40	37	29
	2004	-	-	-	14*	-	-	39	21	13	73	51	29
	2005	-	-	-	39	27	18	48	33	32	60	52	42
	2006	-	-	-	2*	-	-	11	5	4	16	26	12
	2007	-	-	-	30	12	12	53	41	37	82	149	72
	2008	-	-	-	15	2	2	24	14	14	61	27	27
	2009	-	-	-	2*	-	-	7	2	1	12	2	1
	2010	-	-	-	0	-	-	0	-	-	9	14	6
	2011	-	-	-	0	-	-	10	6	4	0	-	-
	2012	-	-	-	2	0	0	0	-	-	1	0	0
	2013	-	-	-	2	0	0	57	27	27	17	8	5
	2014	-	-	-	0	-	-	21	23	14	24	14	13
	2015	1,129	123	123	0	-	-	20	11	10	26	13	13
	2016	723	183	183	5	2	1	9	4	3	81	149	72
	2017	338	249	249	0	-	-	1*	-	-	0	-	-
	2018	868	202	202	0	-	-	1*	-	-	1*	-	-
	2019	1,249	396	396	0	-	-	1*	-	-	1*	-	-
	2020	1,065	357	357	5	0	0	40	37	29	9	14	6
	2021	824	369	369	14	10	7	32	21	15	16	13	9
	2022	1,364	573	573	1*	-	-	1*	-	-	0	-	-
Cutthroat	1999	-	-	-	-	-	-	101	46	46	37	15	15
	2000	-	-	-	57	9	9	20	3	3	10	3	3
	2001	-	-	-	111	6	6	5	-	-	18	4	4
	2002	-	-	-	81	23	23	36	22	17	22	2	2
	2003	-	-	-	20	8	8	36	42	27	17	26	12
	2004	-	-	-	22	7	7	21	7	6	27	18	15
	2005	-	-	-	49	7	7	9	1	1	7	3	2
	2006	-	-	-	31	4	4	4	0	0	25	43	20
	2007	-	-	-	4	0	0	1*	-	-	1*	-	-
	2008	-	-	-	5	2	1	1*	-	-	5	2	1
	2009	-	-	-	3*	-	-	0	-	-	2*	-	-
	2010	-	-	-	32	37	24	17	25	12	3*	-	-
	2011	-	-	-	1	0	0	1	0	0	18	20	12
	2012	-	-	-	0	-	-	1	0	0	1*	-	-
	2013	-	-	-	5	0	0	4	0	0	0	-	-
	2014	-	-	-	1*	-	-	0	-	-	0	-	-
	2015	46	35	35	1	0	0	1*	-	-	0	-	-
	2016	65	30	30	5*	-	-	32	37	24	25	43	20
	2017	20	33	15	0	-	-	0	-	-	0	-	-
	2018	52	49	39	0	-	-	0	-	-	0	-	-
	2019	93	55	55	1*	-	-	0	-	-	1*	-	-
	2020	8	7	4	0	-	-	0	-	-	0	-	-
	2021	4	5	2	5	3	2	1*	-	-	0	-	-
	2022	74	64	55	0	-	-	0	-	-	0	-	-

Note: * indicates value is count, not estimate.

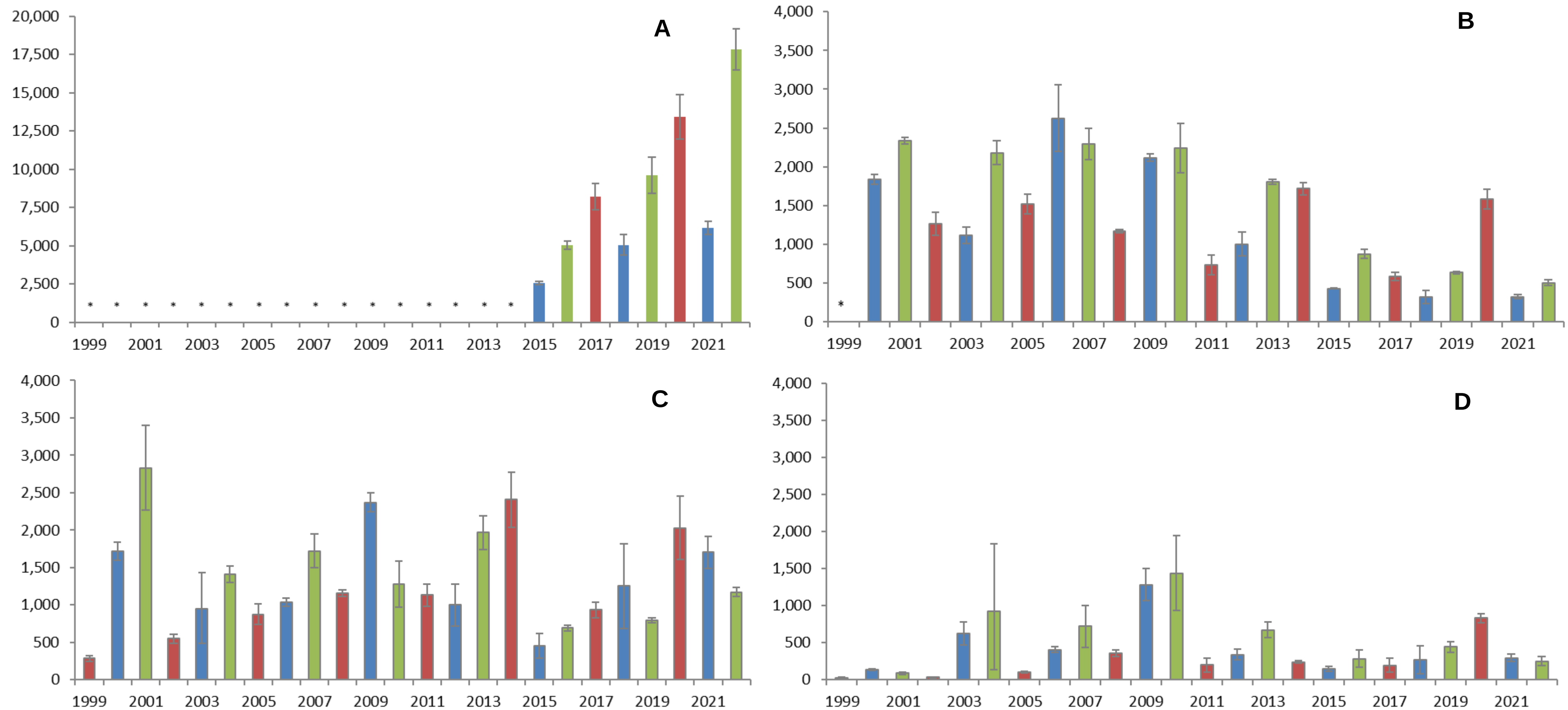

Figure 5. Outmigrant smolt estimates (with 95% CI) for coho salmon at Mainstem Little River (A), Carson Creek (B), Lower South Fork Little River (C), and Upper South Fork Little River (D), 1999-2022. Colors indicate three distinct cohorts of coho and an asterisk (*) indicates year when sampling was not conducted.

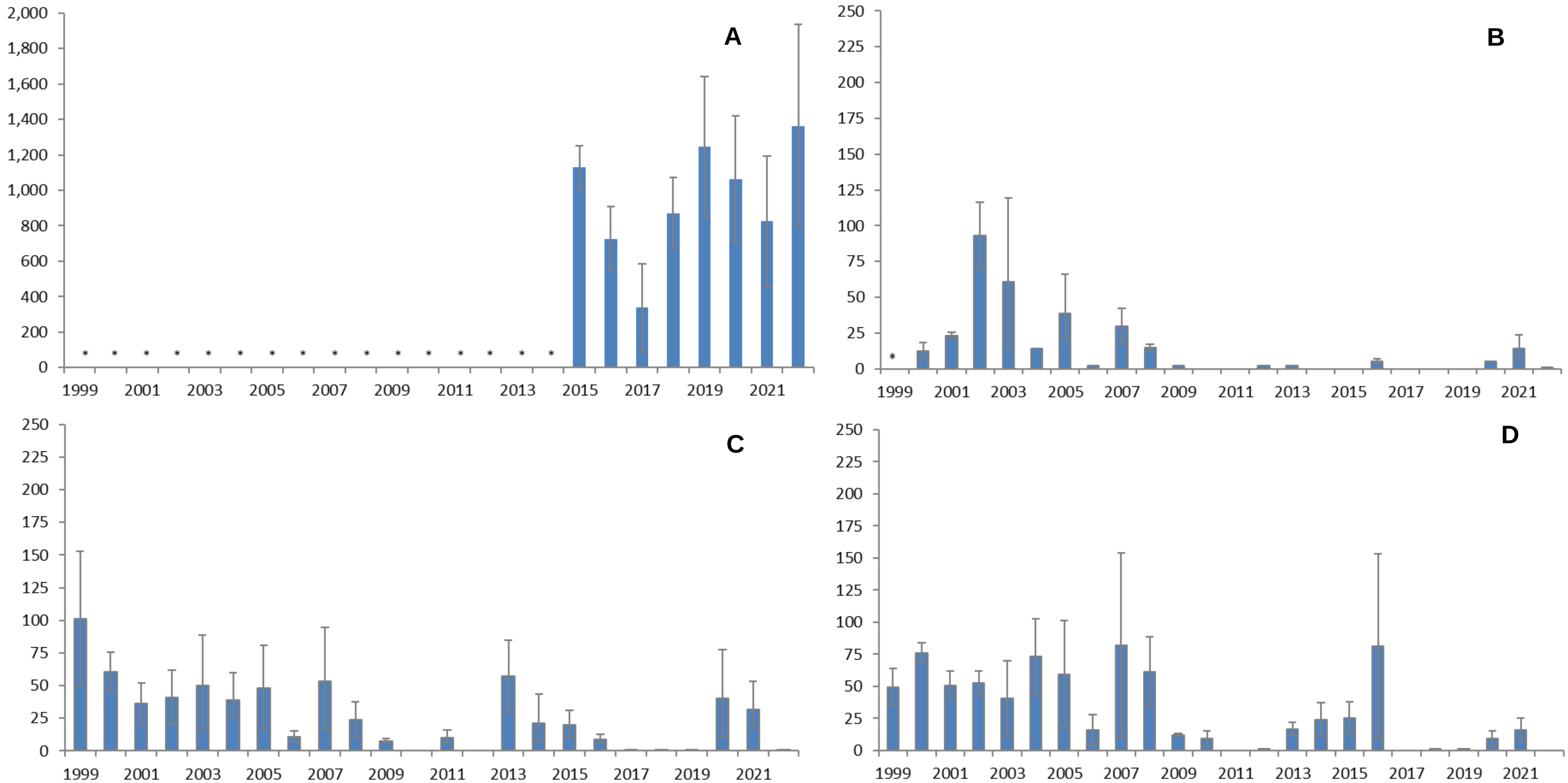

Figure 6. Outmigrant smolt estimates (with 95% CI) and counts (without error bars) for steelhead trout at Mainstem Little River (A) Carson Creek (B), Lower South Fork Little River (C), and Upper South Fork Little River (D), 1999-2022. Asterisk (*) indicates year when sampling was not conducted.

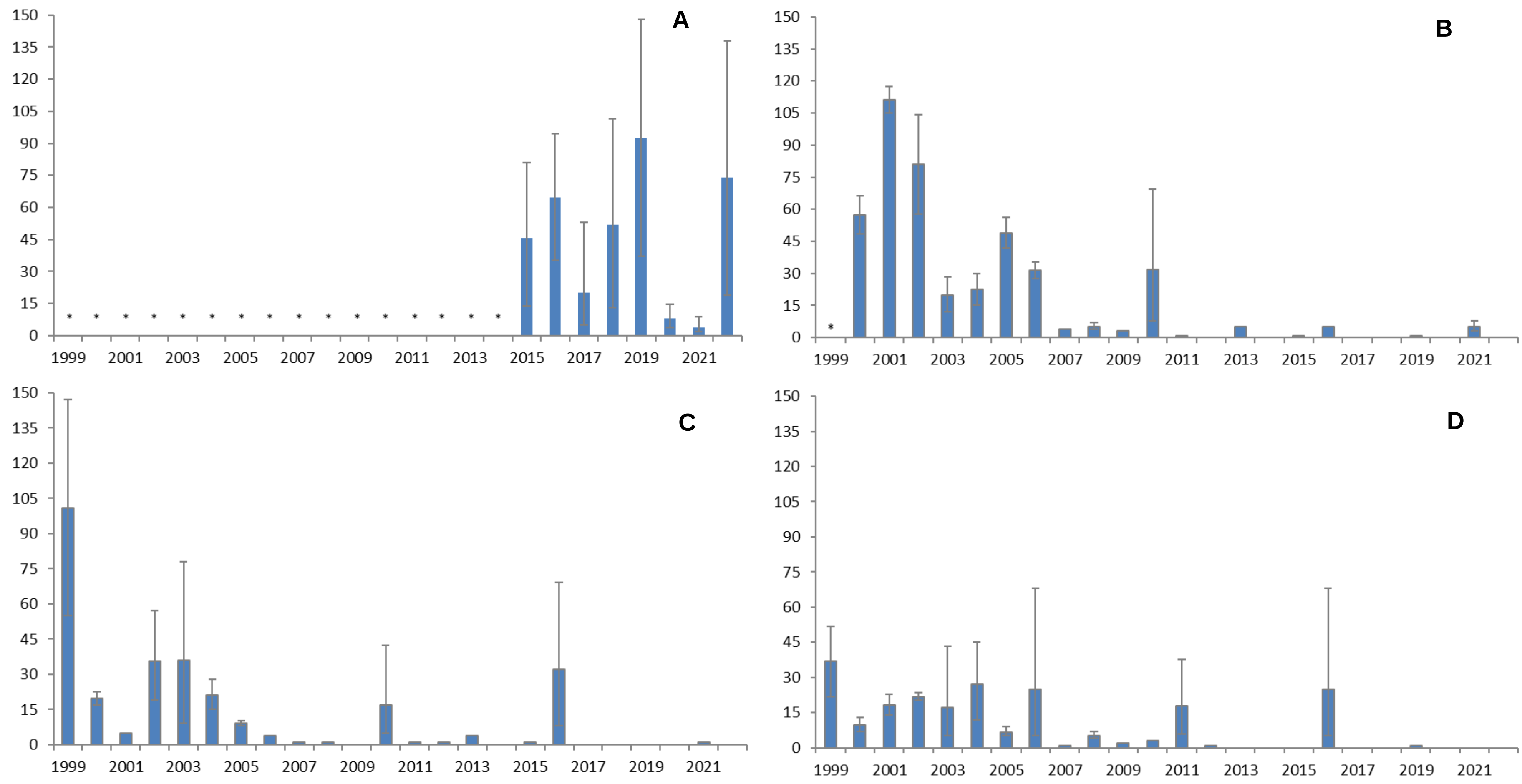

Figure 7. Outmigrant smolt estimates (with 95% CI) and counts (without error bars) for cutthroat trout at Mainstem Little River (A), Carson Creek (B), Lower South Fork Little River (C), and Upper South Fork Little River (D), 1999-2022. Asterisk (*) indicates year when sampling was not conducted.

Table 4. Summary of unmarked salmonids captured during the 2022 trapping season in the Little River watershed, Humboldt County, California.

	Adult		YOY			1+	
Site	**Steelhead**	**Cutthroat**	**Coho**	**Chinook**	**Trout**	**Steelhead**	**Cutthroat**
MSLR	11	41	18	376	79	3,891	922
CC	1	10	400	0	0	8	331
LSFLR	0	5	126	0	0	126	101
USFLR	2	2	197	0	0	103	164
Total	14	58	741	376	79	4,128	1,518

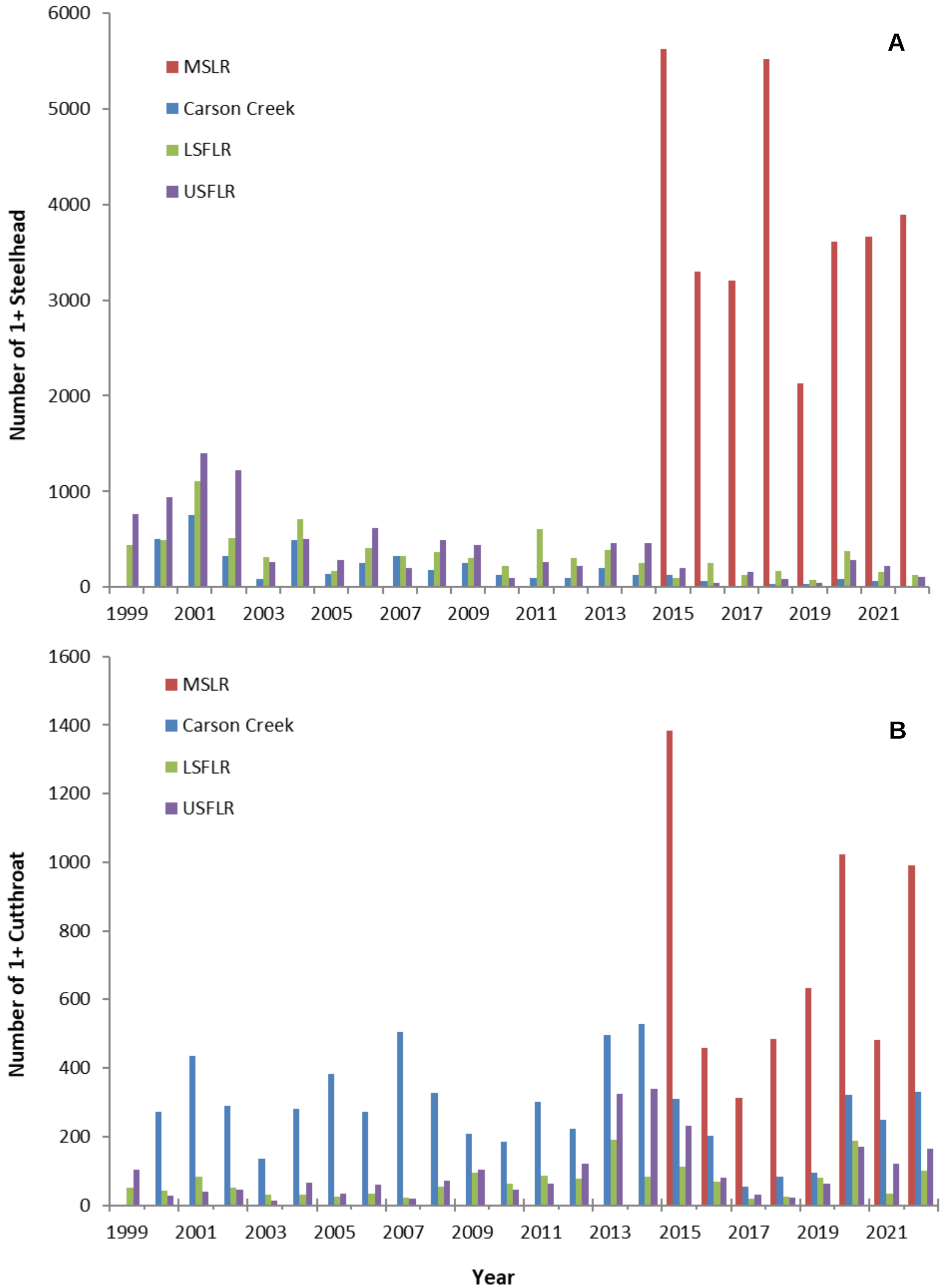

Figure 8. Frequency histogram of cutthroat 1+ (A) and steelhead 1+ (B) counted during outmigrant trapping from 1999-2022 in Little River, Humboldt County, California.

Size and Condition

A total of 4,384 fish were measured and weighed during the 2022 outmigrant trapping season. A summary of the measurements collected were compiled and statistics were calculated for each salmonid species and life history stages at each site (Table 5).

Based on a visual assessment of the 18,138 salmonids handled, the majority (99.5%) appeared to be in good condition and health. Among the 18,138 salmonids handled, a total of 1,547 of those fish were handled a second time because they were recaptured smolts. Eighty-five fish (0.5%) were recorded as injured or unhealthy. Among these fish, 60 had injuries (e.g., bruised, scraped, damaged tail or fins, bite marks), 2 were affected by exothalmia (e.g. protruding eyes), 15 were affected by black spot disease, 1 had a spinal deformity and 7 had various gill irritations.

Table 5. Summary of length and weight for salmonids captured (N = sample size) during the 2022 outmigrant trapping season in Little River, Humboldt County, California.

				Fork Length (mm)		Weight (g)	
Site Name	**Species**	**Age Class**	**N**	**Range**	**Mean**	**Range**	**Mean**
MSLR	Coho	Smolt	1769	70-200	102.1	3.8-95	12.3
	Steelhead	Smolt	242	130-248	173.2	23.2-165.3	54.0
	Steelhead	1+	520	80-192	115	6.1-114	18.3
	Cutthroat	Adult	5	216-315	280.2	97.3-347	241.5
	Cutthroat	Smolt	17	150-236	176.1	34.3-132.3	58.5
	Cutthroat	1+	336	86-198	139.8	7.9-88.8	29.9
CC	Coho	Smolt	298	78-141	102.4	5.2-28.4	11.9
	Steelhead	Smolt	1	202	202	83.4	83.4
	Steelhead	1+	8	103-130	115.3	11.8-26.4	18.2
	Cutthroat	Adult	1	205	205	82.3	82.3
	Cutthroat	1+	198	89-190	127	7.6-80.7	24.8
LSFLR	Coho	Smolt	511	71-136	100.3	5.0-29	11.8
	Steelhead	Smolt	1	178	178	58.8	58.8
	Steelhead	1+	73	78-149	98.3	5.2-34.5	11.8
	Cutthroat	1+	85	85-185	142	7-75.8	33.5
USFLR	Coho	Smolt	144	80-125	101.7	6.4-22	12.3
	Steelhead	1+	77	81-175	103.5	5.9-61.4	13.4
	Cutthroat	1+	98	85-190	122	7.1-90.4	21.3

Mortality

Overall, of the 16,591 individual salmonids captured, the mortality rate was 0.04%. A total of 23 dead salmonids were documented during the 2022 outmigrant trapping season in Little River (Table 6). Those resulting from unknown causes or monitoring activities (n = 7) were reported as mortalities and those clearly from predation (n = 16) were reported separately. Mortalities were observed for coho, steelhead, chinook, sculpin (n = 2), three spined stickleback (n=1) and lamprey (n=1). Predation was observed for coho and lamprey. More details on the cause(s) of the observed mortalities and efforts to minimize them are described in the discussion section.

Migration Timing

A frequency histogram was created using daily smolt captures (i.e., not estimates) to summarize the timing of coho smolt migration at the four monitored sites in Little River (Figure 9). The outmigrant traps appeared to have been installed before the peak of the coho smolt migration. MSLR was initiated approximately four weeks earlier than the mean date. CC and LSFLR were initiated approximately three weeks after the mean date and USFLR was initiated approximately six and a half weeks after the mean date. The tributary traps all seem to have peaked during the first week of May. MSLR coho smolt migration had two distinct peaks. The first peak was on May 7th and the second peak was on May 25th.

Table 6. Summary of salmonid mortality during 2022 outmigrant trapping in Little River, Humboldt County, California.

				Mortality							
				Handling		Unknown*		Predation		Total	
Site	Species	Age Class	Captured (#)	#	%	#	%	#	%	#	%
MSLR	Coho	Smolt	7998	1	0.01%	0	0.00%	1	0.01%	2	0.03%
	Coho	YOY	18	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Coho	Adult	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Chinook	YOY	376	0	0.00%	2	0.53%	0	0.00%	2	0.53%
	Cutthroat	Adult	41	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Smolt	19	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	1+	960	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Adult	11	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Smolt	264	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	1+	3,891	2	0.05%	0	0.00%	0	0.00%	2	0.05%
	Trout	0+	79	0	0.00%	0	0.00%	0	0.00%	0	0.00%
CC	Coho	Smolt	335	0	0.00%	2	0.60%	4	1.19%	6	1.79%
	Coho	YOY	400	0	0.00%	0	0.00%	7	1.75%	7	0.00%
	Coho	Adult	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Chinook	YOY	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Adult	10	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Smolt	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	1+	331	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Adult	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Smolt	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	1+	8	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Trout	0+	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
LSFLR	Coho	Smolt	874	0	0.00%	0	0.00%	3	0.34%	3	0.34%
	Coho	YOY	127	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Coho	Adult	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Chinook	YOY	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Adult	5	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Smolt	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	1+	101	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Adult	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Smolt	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	1+	126	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Trout	0+	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
USFLR	Coho	Smolt	144	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Coho	YOY	197	0	0.00%	0	0.00%	1	0.51%	1	0.00%
	Coho	Adult	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Chinook	YOY	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Adult	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Smolt	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	1+	164	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Adult	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Smolt	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	1+	103	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Trout	0+	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	Coho	Smolt	9,351	1	0.01%	2	0.02%	8	0.09%	11	0.12%
	Coho	YOY	742	0	0.00%	0	0.00%	8	0.00%	8	0.00%
	Coho	Adult	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Chinook	YOY	376	0	0.00%	2	0.53%	0	0.00%	2	0.53%
	Cutthroat	Adult	58	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	Smolt	19	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Cutthroat	1+	1,556	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Adult	14	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	Smolt	266	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Steelhead	1+	4,128	2	0.05%	0	0.00%	0	0.00%	2	0.05%
	Trout	0+	79	0	0.00%	0	0.00%	0	0.00%	0	0.00%

* mortality resulting from unknown causes (i.e., not predation)

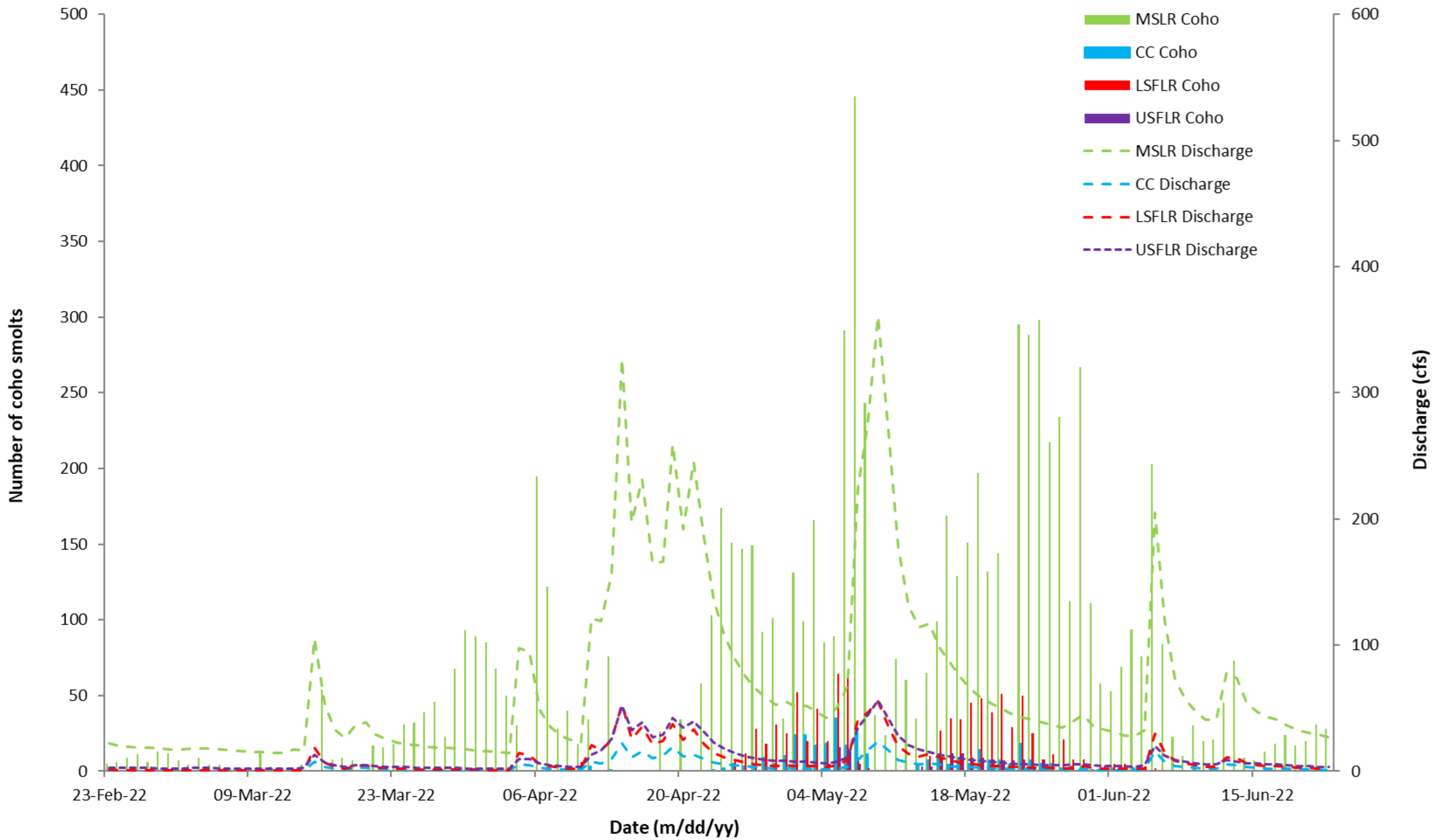

Figure 9. Histogram of coho smolt captures (vertical bars) and stream discharge (dashed lines) during the 2022 trapping season in Little River, Humboldt County, California.

Coho Overwinter Survival

Apparent overwinter survival, which does not account for early emigration, was calculated for LSFLR and USFLR based on 2021 summer juvenile population estimates and 2022 smolt estimates (Table 7). LSFLR had an apparent overwinter survival of 11% which is below average (24%) for this site. USFLR had an apparent overwinter survival of 8% which is below average (24%) for this site. Overwinter survival could not be calculated for CC and MSLR (see Methods for justification).

Table 7. Summary of apparent overwinter survival estimates for coho from 1999-2022 in the Little River watershed, Humboldt County, California.

Site	Smolt Year	Coho (YOY) Summer Population	Coho Smolt Winter Population	Apparent Over-winter Survival Estimate	Drainage Area (Miles^2)	Length of Habitat (Miles)	Summer Population (Fish/Mile)	Winter Population (Fish/Mile)
LSFLR	1999	4,310	287	7%	5.3	2.2	1,959	130
	2000	8,456	1,718	20%	5.3	2.2	3,844	781
	2001	5,103	2,832	55%	5.3	2.2	2,320	1,287
	2002	928	549	59%	5.3	2.2	422	250
	2003	14,322	950	7%	5.3	2.2	6,510	432
	2004	6,320	1,411	22%	5.3	2.2	2,873	642
	2005	4,172	873	21%	5.3	2.2	1,896	397
	2006	6,912	1,039	15%	5.3	2.2	3,142	472
	2007	9,785	1,721	18%	5.3	2.2	4,448	782
	2008	7,943	1,156	15%	5.3	2.2	3,610	525
	2009	10,371	2,372	23%	5.3	2.2	4,714	1,078
	2010	9,937	1,283	13%	5.3	2.2	4,517	583
	2011	2,010	1,130	56%	5.3	2.2	914	514
	2012	8,592	998	12%	5.3	3.0	2,864	333
	2013	10,916	1,966	18%	5.3	3.0	3,639	655
	2014	9,495	2,405	25%	5.3	3.0	3,165	802
	2015	1,131	454	40%	5.3	3.0	377	151
	2016	7,562	691	9%	5.3	3.0	2,521	230
	2017	6,843	934	14%	5.3	3.0	2,281	311
	2018	3,706	1,253	34%	5.3	3.0	1,235	418
	2019	9,164	794	9%	5.3	3.0	3,055	265
	2020	4,452	2,030	46%	5.3	3.0	1,484	677
	2021	7,759	1,702	22%	5.3	3.0	2,586	567
	2022	11,038	1,169	11%	5.3	3.0	3,679	390
USFLR	1999	820	25	3%	5.7	1.6	513	16
	2000	1,279	137	11%	5.7	1.6	799	86
	2001	389	89	23%	5.7	1.6	243	56
	2002	197	30	15%	5.7	1.6	123	19
	2003	8,275	621	8%	5.7	2.0	4,138	310
	2004	3,018	927	31%	5.7	2.0	1,509	464
	2005	1,137	100	9%	5.7	2.0	569	50
	2006	1,881	404	21%	5.7	2.0	941	202
	2007	3,245	719	22%	5.7	2.0	1,623	360
	2008	1,660	354	21%	5.7	2.0	830	177
	2009	5,987	1,282	21%	5.7	2.0	2,994	641
	2010	3,501	1,439	41%	5.7	2.0	1,751	720
	2011	417	198	47%	5.7	2.0	209	99
	2012	2,914	338	12%	5.7	2.0	1,457	169
	2013	2,673	670	25%	5.7	2.0	1,337	335
	2014	769	240	31%	5.7	2.0	385	120
	2015	376	146	39%	5.7	2.0	188	73
	2016	1,730	283	16%	5.7	2.0	865	142
	2017	957	185	19%	5.7	2.0	479	93
	2018	906	267	29%	5.7	2.0	453	134
	2019	2,236	442	20%	5.7	2.0	1,118	221
	2020	1,542	831	54%	5.7	2.0	771	416
	2021	996	296	30%	5.7	2.0	498	148
	2022	3003	250	8%	5.7	2.0	1501.5	125

Species Composition and Abundance

Thirteen species (9 fish and 4 amphibian) were captured in the outmigrant traps during the 2022 season in the Little River watershed (Table 8). Fifty-six percent of the fish species (95% of all captures) were in the genus *Oncorhynchus*. The remainder of species were incidental captures of non-target species, primarily sculpin, three spined stickleback, lamprey, Eulachon and amphibians.

Table 8. Summary of species captured during 1999-2022 outmigrant trapping in the Little River, Humboldt County, California.

		Year																							
Common Name	**Scientific Name**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Coho Salmon	*Oncorhynchus kisutch*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Chinook Salmon	*Oncorhynchus tshawytscha*	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Steelhead	*Oncorhynchus mykiss*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Coastal Cutthroat Trout	*Oncorhynchus clarki clarki*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Eulachon	*Thaleichthys pacificus*	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y
Pacific Lamprey	*Entosphenus tridentatus*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Western Brook Lamprey	*Lampetra richardsoni*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	N	N	N	Y
Pacific Giant Salamander	*Dicamptodon tenebrosus*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tailed Frog	*Ascaphus truei*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	Y
Red-legged Frog	*Rana aurora*	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	N	Y	Y
Rough-skinned Newt	*Taricha granulosa*	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	N	N	N	N	N	N	Y	N
Northwestern Salamander	*Ambystoma gracile*	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y
Prickly Sculpin	*Cottus asper*	N	Y	Y	N	N	N	Y	N	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Humboldt Sucker	*Catostomus occidentalis humboldtianus*	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
Three-Spined Stickleback	*Gasterosteus aculeatus*	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y

Stream Temperature

Water temperature was monitored for 129 days (February 23rd – July 1st) at the MSLR trap site, during which a total of 2,580 measurements were collected. Water temperature was monitored for 66 days (April 8th – June 13th) at CC trap site, during which, a total of 1,320 measurements were collected. Water temperature was monitored for 67 days (April 9th – June 13th) at LSFLR trap site, during which, a total of 1,340 measurements were collected. Water temperature was monitored for 40 days (May 4th – June 13th) at USFLR trap site, during which, a total of 800 measurements were collected. These monitoring periods accounted for 100% of the 2022 outmigrant trapping season at MSLR, CC, LSFLR and USFLR trap sites. Mean daily water temperatures were calculated from these data and temperature profiles were created (Figure 10). Water temperatures were similar among sites, all increased throughout the season as expected, and temperatures stayed within the thermal tolerances for captured species.

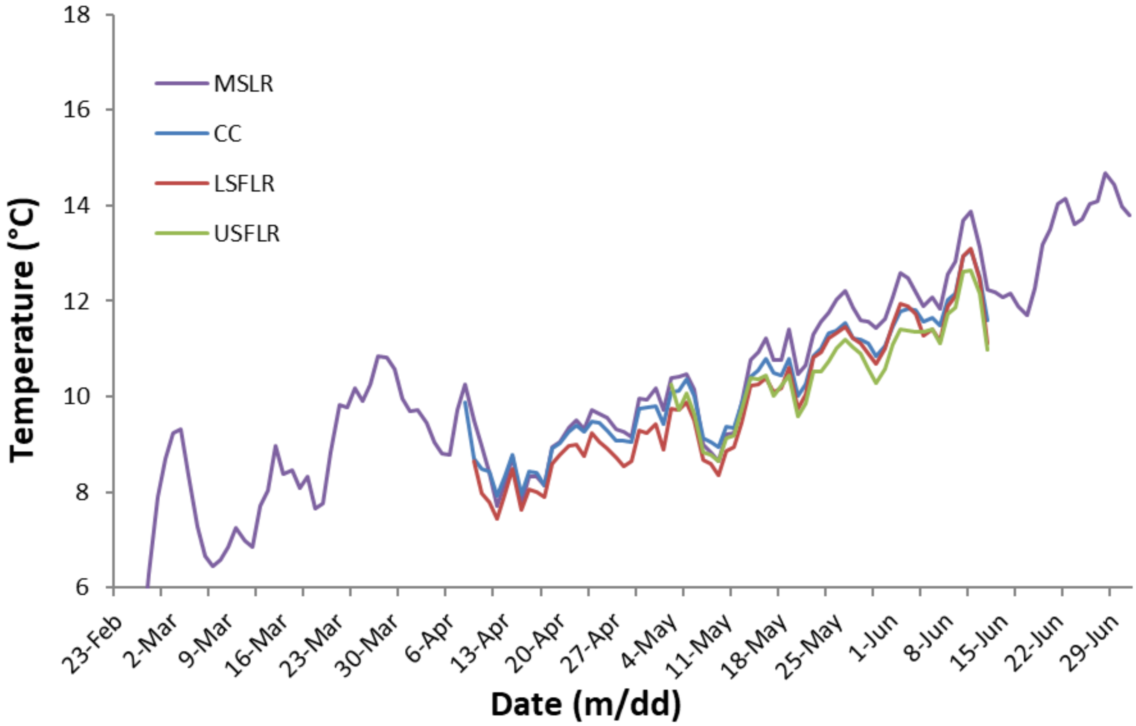

Figure 10. Profiles of average-daily water temperatures recorded at the trapping sites during the 2022 season in the Little River watershed, Humboldt County, California.

Discussion

Population Estimates

Based on the three year life history of coho (Murphy and Meehan 1991), the 2022 population estimates in Little River tributaries was the eighth time this cohort was estimated (Figure 5). The outmigrating coho smolts documented this year in the Little River tributaries suggests that this moderate strength cohort was comparable to the last time (2019) they were monitored. LSFLR appears to be on a slow upward trend since the cohort's lowest estimate in 2016. This moderate strength cohort in Carson Creek continues to be on a decline since its peak in 2001.

The early spring rains in 2022 were light and the tributaries did not experience any significant increase in discharge until early April. Typically, these low flow conditions are ideal for trap installation; however, at the end of February several groups of adult coho and steelhead were observed in the mainstem of Little River near the mouths of LSFLR and USFLR. Approximately 70 coho and 8 steelhead adults appeared to be unspawned and waiting for the tributaries to increase in flow. Based on the number of adults and their behavior, the tributary trap installs were postponed until after the next significant storm event when these fish had a chance to continue their spawning migration. Carson Creek and LSFLR were installed during the second week in April (April 8th and 9th) and USFLR was not installed until May 4th due to an increase in rainfall. There were several storm events in April that caused Carson Creek and LSFLR to be turned off or modified for multiple days to accommodate an increase in flows. It is possible that our sampling time frame did not capture a true representative sample of coho smolts leaving the tributaries. However, Figure 9 indicates that the peak of the outmigration of coho salmon was captured.

2022 was the eighth year of outmigrant trapping on the lower mainstem of Little River which has now allowed us to estimate this coho smolt cohort for the third time. This year's population was the largest estimate (17,843) we have observed in Little River since the mainstem trap was established in 2015. The estimate from 2022 suggests that this moderate strength cohort has been experiencing a steady increase in the estimate of coho smolts since the first time we observed it in 2016. Also, all three cohorts are displaying positive trends in estimate size. Prior to the initiation of the mainstem site, the largest basin-wide coho smolt estimate (sum of tributary estimates) for Little River observed was 5,796. The MSLR estimate should be interpreted as a basin-wide estimate for Little River, not an addition to the tributary estimates. The MSLR estimate includes the progeny of adult fish that may have spawned in the mainstem, non-natal fish that were born in tributaries that reared in the mainstem and natal tributary fish that then migrated past the MSLR site. Increasing evidence indicates that up to 25% of coho smolts in a north coastal California stream can move downstream in fall and winter (Rebenack et al. 2015). Having the RST located in the lower river has allowed GDRCo monitoring efforts to better capture the overall annual production in Little River. The MSLR rotary screw trap is easier to install while spring flows are still elevated and allows for the capture of early emigrants that have potentially begun their downstream migration out of the tributaries. However, undoubtedly, some coho smolts are emigrating downstream below our mainstem monitoring site during winter and early spring prior to the installation of the mainstem trap. The 2022 migration phenology at MSLR was similar to past years where the largest peaks in migration occurred during the first and second weeks in May.

The observed dynamics of coho smolt production both within and between cohorts at the monitored locations in Little River are interesting and presumably a result of multiple factors, including climate, ocean conditions, predator-prey dynamics, spawning and rearing habitat availability, and anthropogenic disturbances, acting synergistically. A comprehensive analysis is needed to better understand what is truly associated with the observed dynamics of coho smolt populations in Little River.

After a slight increase in population size the last two years, steelhead smolt populations were back to very low or not detected at all three Little River tributaries. Cutthroat smolts were only detected at MSLR. Both cutthroat and steelhead smolt estimates at the mainstem site increased compared to 2021. The overall long term trends in the tributaries suggests these trout species may be declining; however, interpreting the population estimates for these species is likely confounded for several reasons. First, for steelhead, the average low numbers observed may be at least partially an artifact from the timing of the trapping seasons. In Blue Creek, tributary to the Klamath River, peak steelhead smolt emigration occurred from mid-March through mid-April (Gale 2003); earlier than the initiation date for several of the later outmigrant trapping seasons in Little River. This explanation seems plausible considering the largest estimates GDRCo calculated occurred during years with the earliest initiation dates (e.g., 1999-2005). Furthermore, our finding that mainstem steelhead smolt estimates have been an order of magnitude greater than any tributary suggests that smolts are moving out of Little River tributaries and rearing in mainstem habitats before the trapping period. Second, low sample sizes produced low confidence in population estimates or did not allow for estimating, limiting the ability to assess population trends. Third, both species are iteroparous and have variable fresh water rearing times (steelhead = 1-3 years and cutthroat = 2-5 years) and ocean rearing times (steelhead = 1- 4 years and cutthroat = 1-2 years) (Moyle 2002), making it difficult to assess population trends using juvenile estimates alone. Lastly, the morphologic criteria used to categorize steelhead and cutthroat as smolts is subjective and may have varied over time among the different crew members. In general categorizing trout as smolts (as compared to 1+ or greater steelhead or cutthroat) has become more conservative over time which may partially explain the observed numbers for these species. Due to the above reasons, the tributary smolt estimates for steelhead and cutthroat trout from this monitoring effort should be used judiciously.

Due to the difficulties in estimating steelhead and cutthroat smolt populations mentioned above, it may be more appropriate to compare the observed numbers of steelhead 1+ and cutthroat trout 1+ to gain a better understanding of the population status for these two species in the Little River basin (Figure 8). When comparing steelhead 1+ numbers at the tributary traps from 1999-2022, the population size appears to be decreasing overtime, but has been relatively stable over that past five years. Perhaps a better measure of the steelhead 1+ population would be to evaluate the observed numbers at the MSLR site. On average, the MSLR site provides a longer trapping season and an earlier installation date than the tributary sites which can provide a larger sample size for comparison. The observed number of steelhead 1+ at the MSLR site from 2015-2022, suggests that the population of this species is relatively stable. We can use this same approach for cutthroat trout 1+ at both the tributary sites and MSLR. The observed numbers of cutthroat trout 1+ at the tributary sites from 1999-2022 suggest that the population size is variable overtime, but it is showing signs of an increase in population size since 2017. The observed number of cutthroat 1+ at MSLR is similar to the numbers at the tributary traps by showing an increase in the last four years and having the third highest count of individuals in 2022.

Similar to recent years, the 2022 initiation of the trapping season at MSLR was not affected by high flows. Due to the light rains in February, the MSLR site was installed on February 23rd which is the earliest initiation date on record. During high flow events, the traps are typically removed or modified to prevent equipment damage or loss, and during these inoperable times fish are not captured. In 2022, there were several significant flow events during the trapping season resulting in 10 inoperable days at MSLR. There was also 10 inoperable days at CC and LSFLR due to high flows. USFLR site had no inoperable days in 2022.

Coho Overwinter Survival

The results from 2022 for apparent overwinter survival of coho should be interpreted cautiously. The apparent overwinter survival estimates are based on the assumption of no immigration or emigration of juveniles between the time of the summer estimate survey and the installation of the outmigrant traps the subsequent spring. Increasing evidence indicates that up to 25% of coho smolts in a north coastal California stream can move downstream in fall and winter (Rebenack et al. 2015). Coho smolts that migrated out of LSFLR and USFLR during this time decrease the overwinter survival statistics. These findings suggest that the closed population assumption is violated and should be considered when interpreting coho overwinter survival results. The proportion of fish emigrating from the sites monitored in Little River prior to the trapping season is unknown, and is likely influenced by factors including population density, winter flows (e.g., frequency and intensity), temperature, food availability, and the amount of suitable winter rearing habitat. Therefore, a detailed analysis is needed to understand what factor(s) likely influence coho overwinter survival in Little River so that these data can be interpreted correctly.

In Little River, evidence continues to suggest that peak discharge has at least some association with apparent overwinter survival. There is a seemingly inverse relationship from 1999-2010 between discharge and apparent overwinter survival (GDRCo 2011), which seems to be further supported by results from 2022. The lowest average apparent overwinter survivals occurred during the 1999 and 2003 smolt cohorts when the Little River peak flow events exceeded 9,400 and 8,500 cubic feet per second (cfs), respectively. Presumably, high flow events increase mortality and/or encourage juveniles to migrate downstream before the trapping season and during the OMT season when the traps are not operational (i.e., peak flow events). Therefore, the true overwinter survival in the Little River watershed is likely higher than that reported here, assuming that fish are utilizing other portions of the Little River watershed (i.e. the mainstem or estuary). Conversely, the highest average apparent overwinter survival was for the 2001 smolt cohort when the peak event (788 cfs) was the lowest since the inception of outmigrant trapping by GDRCo in Little River. Flows during the 2021-2022 winter were mild with only two notable storm events that produced peak flows of 327 cfs and 361 cfs respectively. In 2022, we observed low apparent overwinter survival for both USFLR and LSFLR which was likely due to the late initiation of trapping at those sites. Early emigration from the tributaries is likely influenced by population density. The 2022 MSLR coho smolt estimate is the highest for this cohort and all cohorts. High population density may have encouraged more coho smolts to emigrate from the tributaries prior to our late trap installation date.

Size and Condition

The sizes and weights documented for salmonids in Little River during the 2022 outmigrant trapping season were similar to those reported in years past. The lack of any obvious change in fish size and condition suggests that there have been no significant changes to the availability and quality of rearing habitat in Little River. Salmonid growth increases at varying rates depending on the abundance of aquatic insects and plant life during critical rearing periods (Murphy and Meehan 1991). Size can also be influenced by density related competition (Imre et al. 2005). The seemingly consistent size and length among salmonids captured at the trap sites suggests that these factors are relatively constant in the Little River watershed.

There were two coho smolt captures at MSLR that were significantly larger in size than any other coho smolt captured during Little River outmigrant trapping. The two coho were 199mm and 200mm in length. A genetics sample was taken from one of the individuals, otherwise these fish were not marked with a specific clip and were released downstream. The previous largest coho smolt captured at MSLR was in 2020 and was 175mm, followed by 167mm in 2019 and 166mm in 2018. This may be a new trend and we will continue to investigate and report over time.

Migration Timing

The 2022 migration timing for coho salmon in Little River was variable at our tributary and mainstem traps. There were several storm events during the trapping season that caused closures to the traps, but the most significant event was during the third week of April (Figure 9). Carson Creek and LSFLR were installed the previous week and were closed during the storm for 10 days each until flows receded. MSLR was also closed during the same storm for 7 days but was opened for a day or two in between peak flows. Once the storm event passed, there were no more closures for the remainder of the season and USFLR was installed on May 4th. As flows progressively receded during the spring and into early summer, trap adjustments and modifications were made at all sites throughout the season to accommodate the reduction in flows. Some of these modifications included adding sandbags in front of the RST, repositioning the RST and adjusting the pipe height and McBane angle at the tributary trap sites. Smolt capture rates often increased in the days following trap adjustments. MSLR peaked on May 7th with 446 coho smolt captures. Both CC and USFLR peaked on May 5th with coho smolt captures of 35 and 16 fish, respectively. LSFLR peaked on May 6th with 65 coho smolt captures. The exact reasoning for the observed migration timing is likely due to a number of factors including the size of the fish, flow conditions, water temperature, dissolved oxygen levels, day length, and availability of food (Shapovalov and Taft 1954). These factors presumably contributed to the 2022 outmigrant phenology observed in Little River.

Mortalities

The overall mortality rate observed during the 2022 trapping season was 0.04%. Several factors contributed to the mortalities observed related to the trapping process during the 2022 outmigrant season in Little River. Predation is clearly one factor. Some of the other potential reasons for fish mortality while operating the outmigrant traps may include improper handling, trapping injury, debris loading in the trap box, and employee inexperience. Below we considered the potential role of each of these factors in the observed mortality in 2022.

It is unlikely that employee training and experience negatively contributed to the observed mortality in 2022. All crew members involved in conducting outmigrant trapping in Little River received training and had multiple years of direct experience following the field protocols. Newer employees were also paired up with more experienced employees until the nuances of this specific protocol was understood. This factor is easiest to control with proper training and supervision of field crews in fish handling techniques, and the company’s emphasis on the importance of this issue.

Three determined mortalities, 1 coho smolt and 2 steelhead 1+ were observed during the 2022 trapping season. The coho smolt was determined to have slipped through a hole in a dip net during fish processing and died on the ground. The source of the accident was identified during fish processing and the faulty equipment was immediately replaced. All other nets were inspected the same day and the potential hazard was discussed with each crew member to avoid this in the future. The 2 steelhead 1+ were determined to have died from lack of oxygen in the holding bin. Instead of keeping all the fish in buckets we use a 2’x3’ plastic perforated bin or live-box that is staged in the flow of the river. It was identified that the bin did not have sufficient ventilation to accommodate high numbers of fish; therefore, the bin was modified the same day to allow an increase in water exchange throughout the bin. There were no more mortalities associated with these issues during the remainder of the season.

Seven undetermined mortalities, 2 coho smolts, 2 chinook 0+, 2 sculpin and 1 three spined stickleback were observed during the 2022 trapping season. These undetermined mortalities occurred throughout the season and field observations did not attribute routine or excessive debris accumulation in the trap boxes as the cause. These seven individuals were found inside the trap box upon checking the trap and did not have obvious signs of predation wounds.

Predation in the trap box is difficult to prevent and caused some of the observed mortality in 2022, despite efforts to minimize predation once fish had been trapped. To comply with a reduction in authorized take for Chinook YOY, capture of this age class for all salmonids was intentionally minimized. This was achieved by using larger mesh openings (mesh size opening = 1/2“, diagonally set) on the live-box(es) of all traps. Therefore, most YOY fish that entered a trap could freely escape. During the 2022 trapping season we continued to implement three tactics to minimize predation in the trap. First, we used a small screen cylinder to create a refuge, within the forward trap-box, such that only smaller fish can enter and seek shelter from larger fish which are excluded. Second, cover (i.e., cobbles and vegetation) was also provided in trap-box. This cover was intended to allow smaller fish an alternative means to hide from larger fish in the trap-box. Lastly, a second live box was added to the screw trap to increase space and allow smaller fish an increased chance of avoiding predation by larger fish. Interestingly, upon checking the RST, most larger steelhead and cutthroat trout are found in the back box and do not seem to travel back and forth between the front and back boxes. Despite these efforts we did observe seventeen predation mortalities during the 2022 trapping season. Predation mortalities were observed for coho smolts, coho 0+ and lamprey. While scanning unmarked fish during the workup process, 2 coho smolts were found to be located inside the stomachs of cutthroat trout. One lamprey ammocete was found partially regurgitated from the stomach of a cutthroat trout. The other 4 coho smolts and 10 coho 0+ predation mortalities were either regurgitated during the work-up process or found in the box with clear predation wounds. It is not certain when the predation occurred, but assumed to have happened while in the live box.

While the mortalities observed in 2022 were low, both in percent of fish handled and relative to the take limits provided in our Section 10(a)(1)(A) permit, GDRCo continues to make efforts to further reduce mortality associated with the monitoring efforts. For example, the trapping equipment will be inspected for potential fish hazards and repaired as needed prior to deployment in 2022. Additional training will be supplied to current and existing employees. Furthermore, we will continue to develop and implement new improvements in the trap design and handling procedures as part of our ongoing efforts. GDRCo will continue to strive towards low mortality associated with future trapping efforts.

Potential Research Improvements

GDRCo continues to research and explore options that would improve our methods and data. One way to improve the methodology is by constructing permanent weirs in these sub-basins. This would improve the confidence of the smolt estimates by providing a flexible initiation date and efficient trapping under all but the highest flows. Correlating this to our summer population estimates would lead to reliable overwinter survival estimates, giving us better insight into the quality of the winter habitat in the Little River watershed.

Now that GDRCo is applying PIT tags to smolts in the tributaries during the trapping season, placing fixed PIT tag antennae near the mouths of the tributaries and in mainstem upstream and downstream of those tributaries and perhaps in other tributaries could be beneficial. GDRCo is also contemplating applying PIT tags to 0+ coho in the tributaries during late summer and early fall while conducting Juvenile Summer Abundance Estimate surveys while these fish are being captured for other purposes. Budgeting, logistics and permitting need to be assessed and approved prior to these efforts. This would allow for a better understanding of migration patterns that occur within and outside of the trapping season.

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