California Water Boards

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for Environmental Protection

North Coast Regional Water Quality Control Board

June 27, 2017

Mr. Douglas Cole et. al.
92520 Highway 96
Somes Bar, CA 95568
guestranch@marblemountainranch.com

Dear Douglas and Heidi Cole:

Subject: **Notice of Violation No. 3 of Order No. R1-2016-0031** and Response to Your April 10, 2017, letter Regarding Proposed Time Schedule and March 17, 2017, Notice of Violation No. 2

File: Douglas and Heidi Cole, Marble Mountain Ranch, 92520 Highway 96, Somes Bar, Siskiyou County APN 026-290-200, Klamath River Watershed WDID No. 1A15024NSI

The purpose of this letter is to let you know that you remain in violation of the Cleanup and Abatement and California Water Code section 13267 Order No. R1-2016-0031 by the North Coast Regional Water Quality Control Board (Order), and to respond to your letter, dated April 10, 2017, proposing a "time schedule to complete some of the projects outlined in the State Water Resources Control Board's ("State Water Board") Draft Order WR 2017-00XX-DWR ("Draft Order"), and the North Coast Regional Water Quality Control Board's ("Regional Water Board") Order. This response focuses on the Regional Water Board's Order requirements, those you have addressed, failed to address, and delayed addressing, and concludes with a brief discussion of the report provided by Fiore Geosciences.

In your letter, dated April 10, 2017, you request an update or response to the letter submitted to the Regional Water Board on February 8, 2017. We previously responded to this letter. For our response, please see Attachment A. The next part of your April 10, 2017, correspondence is your position on meeting or declining to meet Regional Water Board's Order directives. The next part of your April 10, 2017, correspondence, Exhibit A, is the Fiori Geoscience Report developed by Rocco Fiore for Marble Mountain Ranch. The last part of the your April 10, 2017, correspondence, Exhibit C, is a proposal from ECORP Consulting to address issues related to the Irving Creek outfall. As we address your concerns regarding the Regional Water Board's Order directives and Notice of Violations No. 2 dated March 17, 2017, we will also address continuing violations of the Order, as necessary, to impress upon you the necessity of your compliance in these proceedings.

To start, we will clarify which Order Directives remain as outstanding deliverables at this time based upon the information submitted.

Violations of Order Directives

Order Directive No. 1
Directive No. 1 remains in effect and requires compliance to address the scope of the issues relevant to the Order. As of June 16, 2017, **Marble Mountain Ranch is 244 days late in complying with Directive No. 1. No extension is granted.** Directive No. 1 states:

1. *Retain an appropriately licensed and experienced California Licensed Professional(s) to evaluate, and provide recommendations on the following:*

   Evaluate the operation of the Pelton wheel to determine if there are methods of diversion operation that would increase efficiency and reduce the required volume of the diversion, such as piping the diversion flow for example. Provide a report including recommendations based upon this evaluation. The evaluation shall consider the following:

   a. *Water balance – in vs. out;*
   b. *Water quality review – in vs. out;*
   c. *Review onsite water needs and usage, and hydropower generation;*
   d. *Review opportunities to optimize water needs and usage for power generation;*
   e. *Review opportunities to reduce water loss or head loss; and*
   f. *Design a delivery system that optimizes water conservation.*

   In the event that this evaluation concludes that a piped delivery system is appropriate, develop a plan to decommission the ditch by removing the outboard berm and restoring all affected watercourses. In addition, provide design standards for slope restoration and outsloping to ensure evenly distributed surface flows. All bare soils shall be stabilized with erosion controls and replanted with native vegetation. ***Submit all information and recommendations as described above on or before 5:00 pm October 15, 2016.***

You request to forego compliance with Directive No. 1. You contend that the requirement to provide a water and energy use efficiency report is unnecessary as your water right allows you to divert, as long as the diverted flows are all put to beneficial use, which you contend is being accomplished; therefore, no report on efficiency of energy and water use is required. This position basically, steps back from previous correspondence, and discussions regarding reaching compliance with Order requirements. We reiterate our previous NOVs: You have known of this requirement since December 3, 2015, and on your own volition, indicated you would provide the information by July of 2016. In previous correspondence, and in meetings, you repeatedly assured staff of the Region Water Board and the Division of Water Rights that you were working on complying with these requirements. In terms of designing an efficient process for the operation of the diversion and ensuring all waters are put to beneficial use, this should be the first priority for you to complete.

The use of water for hydropower is the primary component of the water use that likely can be adjusted to increase efficiencies. Analyzing the use of water for hydropower is necessary to allow a full analysis of alternatives available to reach a conclusion to the violations of the Porter Cologne Water Quality Control Act. Efficiencies can benefit water quality in terms of both effectively minimizing or preventing discharges from the outfall at Irving Creek; operationally preventing and minimizing water and sediment discharges through ditch operation and maintenance; and through identifying the most effective method of diverting flows to ensure beneficial uses of water are protected from thermal and sediment impacts. Whether you are complying with the Porter Cologne Water Quality Control Act is a separate issue from whether you are lawfully diverting and using water under a valid claim of right. Our authority is limited to implementing the federal Clean Water Act, Porter Cologne Water Quality Control Act and the Water Quality Control Plan for the North Coast Region (Basin Plan[1]). This authority is premised upon regulating waste discharges to address the preservation, enhancement, and restoration of beneficial uses[2] in the interest of the public. The authority includes identifying areas where those beneficial uses are susceptible to harm and the mechanism causing harm or potentially causing harm.

The record shows the existing use of this water right as an out of basin transfer, potentially jeopardizing rearing habitat for Coho salmon and other salmonid species in the Klamath River at the mouth of Stanshaw Creek; wherein lies a documented pool providing summer refugia from thermal inclines capable of causing mortality in young of the year. Some of the relevant Beneficial Uses of the Klamath River include Cold Fresh Water, Commercial and Sport Fishing; Spawning, Reproduction and/or Early Development; Rare, Threatened or Endangered Species; Migration of Aquatic Organisms; there are many others as well. In this case, we find evidence in the record that the flows of Stanshaw Creek, likely can, and likely do, have a positive effect upon the rearing habitat of salmonids during the hot weather periods influencing salmonids mortality and survival in the Klamath Basin. As you may be aware, a Karuk Tribal representative reported a fish kill in 2009 during routine sampling. The dead fish were found in the off channel pond fed by Stanshaw Creek. The Tribal representative documented the mortality with photos and found five steelhead and one Coho salmon deceased. The Karuk Tribal representative attributed the mortality to the operation of the Stanshaw Creek diversion through depleting flows into the off channel

[1] http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/basin_plan.shtml (Basin Plan Link)

[2] Water Code Division 1 Chapter 1, section §§100, 100.5, 106.7, Division 7, Chapter 1, §§13000, 13001

pool reducing the off channel pool's volume, resulting in temperature shock to the fish (see Attachment B – 2015-01-28 Email from TSoto to Sanderson fish kill).

Ross Taylor and Associates prepared a report in January of 2015 for the Karuk Tribe, "Findings Report for Stanshaw Creek Habitat and Instream flow Assessment" (Attachment C). This report clearly finds that flows from Stanshaw Creek have a positive effect upon the Stanshaw Creek pool and resident fisheries within the creek and attributes multiple stressors to the operation of the Marble Mountain Ranch diversion. These stressors include loss of benthic macro-invertebrate production and habitat, loss of habitat for resident trout, loss of habitat at the Stanshaw Creek outlet pool, and potential increased temperatures due to operation of the diversion in both the Stanshaw Creek outlet pool and Irving Creek where Stanshaw Creek is diverted to after holding in a pond. These findings translate to potentially less food for fish, less space or cover area for fish, less pool volume for fish, higher water temperatures for fish. Separately or additively, these stressors can adversely affect salmonid spawning, early development, rearing, migration and survival. Of note is that the outlet of Stanshaw Creek into the Klamath River has been the site of instream restoration efforts, as demonstrated by the Stanshaw Creek Coho Habitat Enhancement Project, March 31, 2014 (Attachment D).

The August 3, 2016, letter from the National Oceanic and Atmospheric Administration identifies the importance of Stanshaw Creek outflows for Coho Salmon, a beneficial use of water, and primary consideration in the Klamath Basin; going so far as to identify acceptable bypass flows to guide the operation of the Marble Mountain Ranch Stanshaw Creek diversion, and further requiring that those flows diverted, once used, be returned to the stream of origin to ensure adequate cold water refugia (Attachment E).

The Klamath River Total Maximum Daily Load additionally points out the importance of the Stanshaw Creek cold water resource as a source of refugia for salmonids, by specifically identifying the Stanshaw Creek outflow pool as a source of cold water refugia (Attachment F). The North Coast Region's Policy for the Implementation of the Water Quality Objectives for Temperature and the objective, as stated in Resolution No. R1-2014-0006 (Attachment G, and G-1) further supports the management of temperature through enforcement and permitting as well as through multi agency assessment and collaboration. The Basin Plan Temperature Objective requires Regional Water Board staff to address activities that result in diversion of cold water from natural applications especially wherein the cold water resource is limited and necessary to support beneficial uses.

In conclusion, the out-of-basin transfer of Stanshaw Creek water to Irving Creek through the Marble Mountain Ranch for hydropower and/or domestic use purposes represents a potential and active discharge of waste and a potential threat to beneficial uses that is within our purview to regulate via the Porter Cologne Water Quality Control Act.

Order Directive No. 2

Requires a Restoration and Monitoring Plan; the due date for the plan was September 10, 2016. The highlighted sections of Directive No. 2 below are areas not adequately addressed by Discharger's correspondence dated April 10, 2017. As of June 16, 2017, we have not received a plan meeting Directive requirements. **Marble Mountain Ranch is 279 days late in meeting this requirement.** The Directive remains in effect. Directive No. 2 states:

2. *Retain an appropriately licensed and experienced California- licensed professional to evaluate, assess, and develop a Restoration and Monitoring Plan (RMP) to restore and stabilize the head cut and slope at the outlet of the Stanshaw Creek diversion to the unnamed tributary of Irving Creek. Submit the plan by* ***September 10, 2016,*** *to the Executive Officer for review and approval.*

    a. *The RMP shall (1) restore the vegetative and hydrological functions of the damaged streams to ensure the long term recovery of the affected streams; and (2) replant the slopes and streamside areas with native vegetation to prevent erosion and sediment delivery to streams.*
    b. *The RMP shall include and apply best management practices for all current and planned work associated with construction activities affecting, or having the potential to impact, the ditch outfall, unnamed tributary and Irving Creek. The RMP shall contain, at a minimum, design and construction standards, specifications, and designs for stream restoration, surface drainage controls, erosion control methods and standards for unanticipated precipitation during restoration, compaction standards, an implementation schedule, a monitoring and reporting plan, and success criteria meeting the requirements specified herein.*
    c. *The RMP shall include map(s) and/or project designs at 1:12000 or larger scale (e.g., 1:6000) that delineate existing site conditions including existing channels, the projected restored slopes and stream channels, illustrating all restoration plan work points, spoil disposal sites, re- planting areas, and any other factor that requires mapping or site construction details to complete the scope of work.*
    d. *The RMP shall include a time schedule for completing the work including receiving any necessary permits from State, County and/or federal agencies that may be required. The time schedule must adhere to any regulatory deadlines prescribed by the State Water Resource Control Board or North Coast Regional Water Quality Control Board.*
    e. *To ensure a successful re-vegetation/earthen stabilization effort, site restoration and mitigation, the Discharger shall monitor and report for five years. All tree and shrub plantings must have a minimum of 85% success of thriving growth at the end of five years with a minimum of two consecutive years (two growing seasons) of monitoring after the removal of irrigation. Planting shall be adequately spaced to ensure adequate vegetative cover to control surface erosion and increase soil stability. In the event the re-planting fails, re-planting is required and the monitoring shall be extended for another five years until the 85% success rate of vegetation re-establishment is accomplished. The Dischargers are responsible for replacement planting, additional watering, weeding, invasive/exotic eradication, or any other practice to achieve the success criteria.*

f. *The RMP must include a time schedule for completing the work, including receiving any necessary permits from State, County and/or federal agencies that may be required. The time schedule must describe and include installing temporary erosion control measures prior to October 15, 2016, and completion of slope and ditch outlet restoration by October 15, 2017.*
g. *A monitoring plan is required for all site restoration and replanting to determine the success of stream restoration efforts and re-vegetation. The monitoring plan must include regularly scheduled inspections, and established monitoring photo points of sufficient number to document the site recovery for five years or until the Site is restored, mitigation is complete, vegetation is reestablished, erosion is no longer ongoing and meets the success criteria in the approved RMP. These photo-documentation points shall be selected to document the stability of the tributaries. The Dischargers shall prepare a site map with the photo-documentation points clearly marked. Prior to and immediately after implementing the restoration and/or mitigation, the Dischargers shall photographically document the pre- and post-conditions of the tributaries at the pre-selected photo-documentation points. The Dischargers shall submit the pre-restoration photographs, the post-restoration photographs, and the map with the locations of the photo-documentation points to the Water Board as part of the as-built report as defined below;*

The monitoring plan must include regularly scheduled inspection dates. We recommend October 15, January 5, and March 1 of each year, and a monitoring report is required within 30 days of each inspection. Monitoring Reports shall summarize monitoring results; describe any corrective actions made or proposed to address any failures of the Site and restoration measures (features to be assessed for performance and potential failure include, but are not limited to, erosion controls, stream bed and bank erosion, sediment discharges, work, and re-vegetation); and include narrative and photo documentation of any necessary mitigation and evidence of successful restoration and Site recovery for five years, or until Site recovery meets the approved success criteria. At the conclusion of restoration work, when the site is stable and the monitoring program has been fulfilled, submit a Summary report by ***January 1, 2021, or the year that site remediation and replanting meets the approved success criteria****. The Executive Officer or designee will review the report and determine if the site meets all the requirements and the Order can be terminated.*

We recognize that in your April 10, 2017, correspondence you submitted a brief narrative description developed by ECORP Consulting requesting permission to conduct work in the Irving Creek Drainage to stabilize the outfall claiming that due to there being equipment on site this was a good time for you to do the work. The plan submitted lacks design details and specifics for us to review and approve for implementation. For example:

1. Stating the head cut may be sloped back without specifics is inadequate.
2. Showing a drawing of a root wad and stating this is what will be used to stabilize the head cut without any design details is inadequate.
3. The pictures and narrative had no scale, no diagram, and no clear plan.

4. The narrative did not identify what permits would be applied for and received from appropriate permitting agencies.
5. The narrative and letter requested to work in April of a wet year without consideration for the near stream conditions of the site.
6. No erosion controls were provided in terms of prescribed Best Management Practices to control erosion during and after construction.

We also want to iterate that regardless of the ultimate water delivery solution for the conveyance and the return flows from the diversion; work will be required to stabilize the head cut at the Irving Creek outfall to prevent erosion and sedimentation.

Order Directive No. 3
Directive 3 requires a ditch assessment for erosion and failure prone areas (Directive 3.a) and a Ditch Operations and Maintenance Plan (Directive 3.b) these items were due on October 15, 2016, as of June 16, 2017, you are **244 days late in complying with the directive.**

Order Directive 3 and 3.a

3. *In the event that the delivery system will require continued operation of all or a portion of the diversion ditch, retain an appropriately qualified and experienced California-licensed professional to evaluate and submit a report to the Executive Officer for review and approval by* ***October 15, 2016.*** *The report shall include the following:*

   a. *Evaluation of the entire ditch system, identifying all features and locations susceptible to failure by any of the physical processes and mechanisms described herein, (including but not limited to ditch seepage, berm fill saturation, upslope cutbank stability), and identifying where there is potential for sediment delivery to receiving waters in the event of a failure.*

      Specify appropriate corrective action measures or steps to take, including design and construction standards and an implementation schedule to complete the defined scope of work. In addition, assess all areas of past failures to determine if the features reach Stanshaw Creek and deliver sediment and represent future delivery routes that require mitigation, propose mitigation as necessary to control sediment delivery and surface flows in the event of future failures or during annual rainfall events.

In the April 10, 2017, correspondence, you determined that the Fiore Geosciences report meets this requirement. We acknowledge that the report completes the required inventory of the ditch, but it does not identify mitigations for active and potential erosion with the exception of stating the ditch should continue to operate in substantially the same manner that has led to hundreds of cubic yards of sediment delivery over many years. To continue, we find in your response lacks logic when we consider Fiore Geosciences findings regarding erosion during Water Year 2017. In water year 2017, the data provided by Fiore Geosciences finds 173 cubic yards (yd^3) of sediment is produced from erosional processes associated with the ditch system. Of this 173 yd^3, 12.5 yd^3 is delivered to streams or flood prone areas, with 10 yd^3 of this delivery coming from one site identified in Table 3 as a head cut. We find this erosion occurring in Water Year 2017, even though you claim you have not operated the ditch. This speaks poorly as to the stability of the ditch. These findings represent both a threat of erosion and active erosion; sites prone to these problems likely require mitigation, and/or ongoing monitoring. Your response does not recognize that active and potential sources of erosion require mitigation. Please address the remainder of Directive 3 a, which includes proposing mitigation to address sites that Fiore Geosciences identifies as actively eroding or having the potential to erode.

Order Directive No. 3.b

As you mention in your April 10, 2017, correspondence, you are working with ECORP to develop a ditch operations and maintenance plan. We look forward to receiving the plan when you complete it. As of June 16, 2017, you are **244 days** late in providing the information required to satisfy Directive 3.b.

> b. *A ditch operation and maintenance plan that includes an inspection and maintenance schedule and identifies any permits required for the scope of work anticipated. The plan should include proposed measures to ensure that the slopes above the ditch do not collapse into or block the ditch, that water seepage from the ditch does not saturate underlying materials and result in failure, that the ditch does not overtop the berm, that the berm does not fail, and that sediment does not deliver from the ditch to waters of the state. The plan must also include specifications for measures to be constructed and/or incorporated to prevent further erosion and sediment delivery from the discharge point to Irving Creek, and to restore and stabilize the channel between the discharge point and Irving Creek.*

Directive No. 4.a

We find the Fiore Geosciences report meets Directive 4.a requirements.
Directive 4 *Regardless of the ultimate water delivery system, the following additional measures shall be taken by September 10, 2016, to protect water quality:*

> a. *Assess slopes between the upper ditch and Stanshaw creek and the streambed of Stanshaw Creek and Irving Creek and the unnamed tributary to Irving Creek for stored sediment deposits and erosional sources associated with the past and current failures of the ditch. Identify all erosional issues and those that should be corrected, propose corrective measures and provide a schedule for implementing corrective measures.*

Directive No. 4.b
Directive No. 4.b is partially met, as we have previously stated. In the event the ditch again becomes operational, additional water quality monitoring will be required.

> *b. Ensure that water used onsite, conveyed in the ditch and discharged does not adversely impact waters of the state. Develop a sampling plan to assess the quality of water in the ditch as it passes through the ranch property for potential sources of fecal coliform, total coliform, total petroleum hydrocarbons, temperature, and nutrients. The sampling plan shall assess water quality above the diversion and ranch complex, and below the ranch complex to evaluate if there are any pollutants entering the surface waters from the ditch or pond. Submit the Sampling Plan for approval by the Executive Officer by September 10, 2016. Upon approval implement the sampling plan and provide results of the sampling by November 1, 2016. In the event that sampling identifies inputs of constituents of concern, then develop a plan to remedy the discharges and submit the plan by December 1, 2016, to the Executive Officer for review and approval.*

Directive No. 5
Directive 5 requires the submittal of quarterly progress reports.

We are taking a broad view of progress reports and allowing the correspondence you have submitted to meet this requirement. However, we expect compliance with outstanding directives and regular progress report as required by Directive No. 5, are a good way for you to let us know you are working toward compliance.

Directive No. 6
Directive 6 requires all work to be completed by October 15, 2018.

You are in compliance with this requirement, as long as you complete all required work by October 15, 2018.

Directive No. 7
Directive 7 requires a completion report following completion of the required work.

The completion report is due on December 15, 2018.

Fiore Geosciences Report (Fiore Report)
As noted above, the report provides information that meets some of the Order Directive requirements, but falls short in meeting all requirements. In addition, the Fiore Report itself provides evidence of active erosion associated with the ditch in a water year you contend you have not operated the ditch for hydropower. Yet, the Fiore Report's recommendations fail to address Order requirements adequately by providing mitigation plans and designs that can be accepted and then submitted to the appropriate agencies for permitting.

The Fiore Report, as we interpret it, additionally appears to identify that over the operational period of the ditch spanning from 1956 to the present water year the ditch has caused 1314 yd^3 of sediment delivery from 11 sites. Fiore Report finds the Irving Creek outfall erosional void as representing 775 yd^3 of erosion. The Fiore Report then extrapolates this data over a 72-year period and allows that 11 yd^3/year likely eroded over the 72-year period. This finding seems somewhat inconsistent with the statement in Table 3, emphasis added "<u>3) Pre-WY2017 features were most likely triggered by storms during WY 2006 and previous water Years</u>". As do we, it appears that Fiore Report recognizes that the erosional voids associated with the ditch were likely triggered by an event; a ditch failure is a likely cause in many locations. One cannot know the past, but one can assess the present, and as such, at present, as identified in Regional Water Board staff *Inspection Report Stanshaw Creek Diversion, Marble Mountain Ranch, Douglas and Heidi Cole, Landowners, 92520 Hwy 96 Somes Bar. Siskiyou County dated March 9, 2015*, (RWB Inspection Report) (Attachment G) and as supported by Fiore Report, ditch failures appear to be associated with ditch overtopping or berm saturation, cut bank slumps, and ditch capacity loss through sediment accumulation resulting in overtopping and berm saturation or a combination thereof.

The Fiore Report identifies approximately 30 erosional features (see figure 2) and does not recommend any additional work other than continuing to operate the ditch in a similar manner, with the exception of ditch dredging, ditch enlargement, and simple (undefined) measures of low cost erosion controls without design details, best management practices, and a schedule for proposed work.

In regard to the ditch stream crossing, approximately located in the vicinity of Fiore Report figure 2 points 474-488, the Fiore Report incorrectly characterizes the Regional Water Board inspector's findings in the RWB Inspection Report by assigning these values (150-300 yds^3) to an erosion potential rather than the intended erosional void caused in part by a shotgunned overflow culvert and likely past ditch failures, which resulted in an erosional void estimated as 150-300 yd^3 by Regional Water Board staff. The RWB Inspection Report estimated range of 150-300 yd^3 pertains to the existing erosional void as a delivery volume essentially subject to penalty and is not directed at defining the erosional volume should the existing culvert under the ditch fail. Figure 3 of the Fiore Report shows this location, and it is evident that active erosion is continuing on exposed soils due to natural and diverted flows. This would indicate that the void is likely enlarging through the interaction of the shotgunned culvert installed to control ditch overflow and culvert stream crossing. Continued erosion of these areas increases the potential for the ditch to fail at this location and deliver the sediment volume of 80 yd^3 projected by Fiore Report. It is of note, that in a year when the ditch is not being operated for hydropower, we see the shotgunned overflow functioning in Figure 3 of Fiore Report.

Regarding the threat of delivery assessment provided by Fiore Report in terms of identifying the first 1,000 feet of the Stanshaw Creek diversion ditch as representing the highest threat of delivery; we do not disagree. However, we note that no mitigation plans have been provided to address areas identified as erosional problems as required by Directive 3.a.

Conclusion:

To date you remain in violation with a majority of Order Directives. A summary of the days of violation are within this Notice of Violation. Please be aware that you may be subject to administrative civil liabilities for failure to comply with the Order. The liabilities can be up to $5,000 per day pursuant to Water Code section 13350 for each day the violation occurs. When there is a discharge, the liabilities can be up to $10,000 per day and $10 per gallon of waste discharged pursuant to Water Code sections 13385.

Insofar as the April 10, 2017, letter addresses water right issues, the Regional Water Board's authority does not extend to the regulation and enforcement of water rights. Please direct any questions regarding the Draft Order to the enforcement staff at the Division of Water Rights.

If you have any questions, please contact Stormer Feiler of my staff by email at Stormer.Feiler@waterboards.ca.gov, or by phone at (707) 543-7128.

Sincerely,

Shin-Roei Lee
Shin-Roei Lee
2017.06.27 16:24:22 -07'00'
Water Boards

Shin-Roei Lee
Assistant Executive Officer

170627_SRF_dp_MarbleMountain_NOV3

Enclosures:
Attachment A- 170424_SRF_RWB 4-24-17 response letter
Attachment B- 2015.01.28 Email from TSoto to Sanderson fish kill
Attachment C- Ross Taylor and Associates prepared a report, January of 2015, "Findings Report for Stanshaw Creek Habitat and Instream flow Assessment"
Attachment D- Stanshaw Creek Coho Habitat Enhancement Project FRGP Grant #P1110319
Attachment E- 20160803 Stanshaw NMFS final recommendation letter
Attachment F- Appendix 9 Klamath TMDL Thermal Refugia Locations
Attachment G- Order No. R1-2014-0006 Att. 1
Attachment G-1- Order No. R1-2014-0006 Att. 2
Attachment H- RWB Staff Inspection Report

Certified-Return Receipt Requested

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North Coast Regional Water Quality Control Board

April 24, 2017

Mr. Douglas Cole et. al.
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Dear Douglas and Heidi Cole:

Subject: February 8, 2017, Letter Regarding Proposed Time Schedule for Projects and Marble Mountain Ranch

The purpose of this letter is to respond to your letter, dated February 8, 2017, proposing a "time schedule to complete many of the projects outlined in the State Water Resources Control Board's ("State Water Board") Draft Order WR 2017-00XX-DWR ("Draft Order"), and the North Coast Regional Water Quality Control Board's ("Regional Water Board") Cleanup and Abatement Order Rl-2016-0031 ("CAO")."

The CAO is a final order of the Regional Water Board. Unless rescinded or revised, the time schedule in the CAO cannot be changed. For issues of delayed compliance, the CAO, page 13, paragraph 14, states:

> If for any reason, the Dischargers are unable to perform any activity or submit any document in compliance with the schedule set forth herein, or in compliance with any work schedule submitted pursuant to this Order and approved by the Assistant Executive Officer, the Dischargers may request, in writing, an extension of the time specified. The extension request shall include justification for the delay. Any extension request shall be submitted as soon as a delay is recognized and prior to the compliance date. An extension may be granted by revision of this Order or by a letter from the Assistant Executive Officer.

To date, the CAO has not been revised nor has the Assistant Executive Office issued a letter authorizing any extensions. The time schedule in the CAO was based on a proposed time schedule you provided to us by letter dated March 24, 2016. The final CAO extended all of the deadlines that would have passed before we issued the CAO, effectively granting you extensions.

On August 26, 2016, you asked us to extend deadlines in the CAO. You anticipated submitting a proposed Restoration Monitoring Plan ("RMP") by March 31, 2017, rather than September 10, 2016, a ditch evaluation report by March 31, 2017, rather than by October 15, 2016, and completing the energy audit and water efficiency studies by October 29, 2016, rather than by October 15, 2016.

On October 18, 2016, Regional Water Board staff issued you a Notice of Violation ("NOV") notifying you that you were in non-compliance with Directives 2 and 4a. You achieved partial compliance with Directive 4b by submitting the water quality sampling plan on September 9, 2016. However, other portions of Directive 4b were incomplete and the proposed water quality sampling plan, which would not sample Irving Creek, was deemed adequate, but only because discharges to Irving Creek were not occurring. If discharges to Irving Creek resume, the proposed water quality sampling plan will be insufficient.

On February 8, 2017, you notified Regional Water Board staff that you would require additional extensions and would cease work on other project milestones. You stated that you would delay assessing the slope of the Irving Creek outfall until February 29, 2017 (Directive 4a). You would also delay stabilizing the headcut at Irving Creek from October 15, 2016 to December 31, 2017 (Directive 4b). You would not fully implement the water quality sampling plan (Directive 4b) and would not complete the energy audit or water efficiency study (Directive 1) or restore the eroded Irving Creek outfall and ditch outlet (Directive 5).

On March 17, 2017, Regional Water Board staff issued you a NOV providing notice to you that you are in violation of the CAO. The March 17, 2017 NOV also addresses your requests for time schedule extensions and the Assistant Executive Officer's basis for denying your requests. Due to the ongoing delay in implementing project milestones you proposed to meet CAO directives, and subsequently, in correspondence, your stated intent to abandon other CAO requirements, I decline to modify the CAO to grant extensions at this time. Instead, the Regional Water Board staff will exercise enforcement discretion in determining whether to take further enforcement action to address the violations described in the NOVs and in determining what form any further enforcement action should take.

Insofar as your February 8, 2017, letter addresses water right issues, the Regional Water Board's authority does not extend to the regulation and enforcement of water rights. Please direct any questions regarding the Draft Order to the enforcement staff at the Division of Water Rights.

If you have any questions, please contact Stormer Feiler of my staff by email at Stormer.Feiler@waterboards.ca.gov, or by phone at (707) 543-7128, or his supervisor, Diana Henrioulle, by email at Diana.Henrioulle@waterboards.ca.gov, or by phone at (707) 576-2350.

Sincerely,

Matthias St.John
Digitally signed by Matthias St.John
Date: 2017.04.24 13:03:38 -07'00'
Water Boards

Matthias St. John
Executive Officer

170424_SRF_dp_MarbleMountainRanch_Response

Certified-Return Receipt Requested

cc: Barbara Brenner
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1414 K Street, 3rd Floor
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Anderson, Skyler@Waterboards

From:	Toz Soto <tsoto@karuk.us>
Sent:	Wednesday, January 28, 2015 9:43 AM
To:	Anderson, Skyler@Waterboards
Subject:	RE: Stanshaw Creek
Attachments:	RTA_Findings Report_Stanshaw Ck_habiat-flow assess_JAN 2015.pdf

Hello Skyler

Sorry its taken so long to respond, I was on vacation when this email was received and it got lost is my inbox.

I've observed fish mortality in Stanshaw creek only once back in 2009, but believe it occurs more often during drought years when water supply is limited. The dead fish were found in the off channel pond fed by Stanshaw Creek that is located along the mainstem Klamath River floodplain near the mouth of Stanshaw Creek , a description of the pond is included in the attached habitat report by Ross Taylor. The report was also recently shared with Taro Murano of the Waterboard. I documented the mortality in the off channel pond with photos, but did not do a write up. I believe the cause of mortality was simply lack of flow entering the pond, a minimal amount of flow is needed to maintain volume and suitable water quality conditions for juvenile salmon. I found one dead juvenile coho salmon and five dead juvenile steelhead in late July of 2009. I believe the fish died from temperature shock after the flows into the pond were reduced by the Marble Mtn Ranch diversion to a point where the pond had lost enough volume and depth to be cold enough to support fish. At the time, the pond was fed by a side channel of Stanshaw Creek, but since that time our fisheries crews have manually redirected the majority of flows in to the pond by simply moving rocks to enhance flow to the off channel pond.

I can be reached at 530-627-3116 ext 1 if you wish to discuss these issues or send additional questions.
thanks

toz

Toz Soto
Karuk Department of Natural Resources
Fisheries Program Coordinator

From: Anderson, Skyler@Waterboards [Skyler.Anderson@waterboards.ca.gov]
Sent: Monday, January 05, 2015 2:14 PM
To: Toz Soto
Subject: Stanshaw Creek

Toz,

My name is Skyler Anderson and I work in the Division of Water Rights for the State Water Resources Control Board. I am writing to you in regards to the Marble Mountain stakeholders meeting on the 17th of December 2014 in Orleans. Some of the Stake holders at the meeting have indicated that you may have information on fish kills in Stanshaw Creek? If you do have information on any fish kills in Stanshaw Creek can you forward me that information. Also, I would be interested in receiving any documents pertaining to habitat study's or spawning surveys in Stanshaw Creek.

Thank you,

Skyler Anderson, Environmental Scientist

Enforcement Unit 5, Division of Water Rights
State Water Resources Control Board
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Findings Report for Stanshaw Creek Habitat and Instream Flow Assessment

Prepared for the Karuk Tribe

By

Ross Taylor and Associates

January 2015

Findings Report for Stanshaw Creek Habitat and Instream Flow Assessment

Stanshaw Creek is a small tributary of the Klamath River with a drainage area of approximately four square miles (Figure 1). The creek's confluence with the Klamath River is located at N41.4764518; W123.5111116 (Figure 1). Stanshaw Creek has approximately 5,500 feet of potential fish-bearing habitat (up to sustained slope >15% on the USGS topographic map). The first 2,500 feet has a channel slope of approximately 9% and the next 3,000 feet has an overall slope of nearly 11%. The mouth of Stanshaw Creek enters the Klamath River approximately 1,400 feet downstream of Highway 96 (at CalTrans post-mile 8.20).

In November of 2014, the Karuk Tribe requested that Ross Taylor and Associates (RTA) conduct a habitat assessment of Stanshaw Creek. Ross Taylor is an American Fisheries Society Certified Fisheries Professional (#3438) with 28 years of field experience in northern California watersheds. Since 2009, Taylor has also served as the lead fisheries scientist for the State Water Resources Control Board (SWRCB) in conjunction with monitoring the fisheries of Rush and Lee Vining creeks, the primary tributaries to Mono Lake that are also subject to water withdrawals by Los Angeles Department of Water and Power (LADWP). Taylor was tasked by the SWRCB to develop instream flow recommendations to achieve lake level recovery targets, enhance stream and fish restoration, as well as maintain LADWP's ability to reliably export water.

Stanshaw Creek – Sampling Methods:

The objective of conducting the habitat survey was to determine the suitability of Stanshaw Creek in supporting the rearing and spawning of coho salmon and steelhead. The Karuk Tribe also requested that RTA make instream flow recommendations that would provide perennial flow to lower Stanshaw Creek sufficient to maintain off-channel rearing habitat and connectivity with the Klamath River.

On November 17, 2014 RTA performed the Stanshaw Creek habitat assessment using methods consistent with those described in the California Department of Fish and Wildlife (CDFW) *California Salmonid Stream Habitat Restoration Manual*. RTA walked Stanshaw Creek from its confluence with the Klamath River upstream for approximately 4,300 feet and measured and recorded the following habitat metrics: wetted channel widths, active channel widths, pool frequency, pool type, maximum pool depths, pool tail-water depths, and pool cover. Distances between pools were estimated by counting paces (2.5 feet/pace) and lengths of pools were measured to the nearest 0.1 foot with a stadia rod. The stadia rod was also used to measure pool widths and depths to the nearest 0.1 foot. Riparian canopy shading was estimated with a densiometer. RTA also made observations regarding: presence of potential migration barriers to adult and juvenile salmonids, quality of potential instream rearing and spawning habitat, and fish presence. Quality of pool habitat was classified as "poor, fair or good" consistent with shelter rating values in the *California Salmonid Stream Habitat Restoration Manual*. At two locations along Stanshaw Creek, RTA estimated streamflow using a timed-float methodology. All data and observations were recorded in a bound, waterproof field notebook.

RTA also inspected the Stanshaw Creek surface water diversion located approximately 4,200 feet upstream of Highway 96. This diversion is maintained and utilized by the Marble Mountain Ranch (MMR) for power generation and other domestic uses. None of the water diverted from Stanshaw Creek by the MMR is returned to Stanshaw Creek; all non-consumptive flow is bypassed into Irving Creek.

To assist in making flow recommendations for Stanshaw Creek, RTA was also provided a spreadsheet of streamflow measurements made between September 2000 and August 2014 at key locations within Stanshaw and Irving creeks. Additional information and technical reports regarding the use of off-channel ponds by juvenile coho salmon were utilized in developing flow recommendations.

Stanshaw Creek – Habitat Typing Results:

The habitat typing survey was started at 11:00 hours and was completed at 15:25 hours. Starting at the off-channel pond, Taylor walked approximately 4,300 feet of Stanshaw Creek and took measurements at 26 pool habitat units and one run habitat unit. These 27 habitat units encompassed 364 feet of channel length or 8.4% of the surveyed reach. The remaining channel reaches in-between the 26 pools and one run consisted of high-gradient riffles, step-runs/step-pools, and cascades. The small pools present within the step-runs/step-pools and many of the high-gradient riffles were too short in length to separate out as individual habitat units (the CDFW protocol defines that a habitat unit must be longer than the wetted channel width). The Stanshaw Creek habitat typing data are tabulated in Appendix A.

Three types of pools were observed within Stanshaw Creek: 12 plunge pools (PLP), 11 main channel pools (MCP), and three dammed pools (DMP). Maximum depths within these 26 pools ranged between 1.0 and 2.8 feet deep with an average of 1.6 feet. Cover within pools was relatively sparse and was comprised primarily of boulders and bubble curtain. Large wood was present as cover habitat in only four pools. Suitably-sized spawning substrate was present at five locations within Stanshaw Creek: two locations were downstream of Highway 96 and three were between Highway 96 and the MMR diversion. Stanshaw Creek's moderate channel slope and confinement most likely limits the amount of small cobble/gravel accumulations at pool-tails.

During the habitat typing survey two fish were observed, both upstream of Highway 96. These fish were salmonids and were most likely resident coastal rainbow trout or juvenile steelhead. The riparian zone along Stanshaw Creek was comprised mostly of hardwoods with some conifer. A densiometer reading was made at approximately the 2,000 foot location and was 73.5%, even though a significant amount of leaf fall had already occurred. During the summer months, it appears that Stanshaw Creek receives ample shading from the riparian over-story.

Several impediments to fish migration were noted during the Stanshaw Creek habitat assessment. The culverts underneath Highway 96 are mostly likely a complete barrier to juvenile and resident salmonids as well as a severe impediment to adult salmon and steelhead. There are two arch culverts of the following dimensions: 9.0 ft span by 6.5 ft rise. The floors and side walls up about one foot-high are concrete and the arches are structural steel plate. Both arches are set a moderate (and uneven) slope and are approximately 125 feet in length. A first-pass stream crossing assessment was conducted at this crossing in 2003 by the Humboldt State University engineering department's pilot study for CalTrans, but the crossing was never surveyed and fully assessed for fish passage. Just upstream of Highway 96, a natural bedrock and boulder cascade probably blocks most fish passage. This cascade has an eight to ten foot drop over a distance of approximately 30 feet. A second cascade was also observed approximately 3,500 feet up Stanshaw Creek that had a drop of six to seven feet over a 30-foot distance. Additionally, several plunge pools had drops that exceeded three feet.

Because the MMR diversion is located on U.S. Forest Service property, RTA was able to inspect the diversion during the 11/17/14 stream habitat assessment. Stanshaw Creek was being diverted by the placement of rocks across the channel which shunted nearly all of the surface flow into an open ditch. At the point-of-diversion (POD), the diversion was not screened and RTA conservatively estimated that 80-90% of the surface flow was being diverted into the ditch. Approximately 300 feet of the diversion ditch was inspected and the following was noted: (1) a bypass existed to possibly return excess flow to Stanshaw Creek; however all the diverted flow was going down the ditch and (2) this reach of the ditch had failed in several spots and was crudely repaired with cinder blocks, plastic sheeting and fill material. Leakage and erosion was noted at these locations.

The off-channel pond at the mouth of Stanshaw Creek was also examined on 11/17/14 by RTA. The creek channel made a nearly 90 degree turn to flow into the head of the pond, with flow directed towards the pond with hand placed rocks. A secondary channel straight to the Klamath River was dry. The pond had two outlet channels to the Klamath River and both were dry on 11/17/14; however one appeared to have recently been flowing (from leaf debris line).

<u>Stanshaw Creek – Streamflow:</u>

RTA made two streamflow measurements, using a timed-float methodology where a short reach of channel was selected that had relatively uniform width and depth. In each reach, five timed floats were conducted using buoyant sticks in which a stop watch was used to time how long it took each stick to travel the pre-determined distance (four feet at each location). The short reach's area was computed as average length x average depth; then flow (ft^3/sec) was calculated by multiplying the area (ft^2) by the average velocity of the five timed floats (ft/sec). The first streamflow estimate was made just upstream of the off-channel pond and was 1.3 cfs. The second streamflow measurement was made at 4,180 feet up Stanshaw Creek and equaled 0.8 cfs. RTA did not conduct a timed-float within the MMR diversion or in Stanshaw Creek immediately below the POD; however the surface flow immediately below the POD was very low. These streamflow measurements and observations on 11/17/14 indicate that between MMR 's POD and the off-channel pond, Stanshaw Creek was gaining surface flow – possibly influenced by the above average September-November rainfall, continued runoff from recent rainfall, leakage from the MMR diversion canal, and/or the seasonal lack of transpiration by the riparian vegetation.

RTA was also provided a spreadsheet of 101 streamflow measurements made by the Karuk Tribe and the USFS Orleans Ranger District in June - October between 2000 and 2014. On any given date, streamflow measurements were typically made at two or more of the following locations: above the MMR POD, within the MMR diversion, in the MMR diversion return to Irving Creek, and/or in Stanshaw Creek at various locations downstream of MMR's POD. These flow measurements consistently document the MMR diversion taking most of the streamflow and very little flow present in lower Stanshaw Creek. In most cases, the channel between MMR's POD and the off-channel pond was a losing reach, in which streamflow continued to decrease in a downstream direction. Table 1 provides four example dates of Stanshaw Creek streamflow measurements.

Table 1. Streamflow measurements at various locations within Stanshaw Creek.

Measurement Location	Date of Measurement	Streamflow (cfs)	Measurement Taken by
100 ft upstream of MMR Diversion	09/04/03	2.4	Orleans RD
Within flume diversion to MMR	09/04/03	1.9	Orleans RD
Diversion outflow into Irving Ck	09/04/03	1.5	Orleans RD
200 ft downstream of MMR diversion	09/04/03	0.3	Orleans RD
In Irving Creek- directly in diversion near road xing	08/30/11	2.7	Karuk Tribe
In Stanshaw Creek by Highway 96	08/30/11	0.4	Karuk Tribe
In Stanshaw Creek just above MMR diversion	09/13/11	3.2	Karuk Tribe
In Stanshaw Creek just below MMR diversion	09/13/11	0.5	Karuk Tribe
In Stanshaw Creek by Highway 96	09/13/11	0.6	Karuk Tribe
150 ft upstream of MMR Diversion	10/04/12	2.0	Orleans RD
120 ft downstream of MMR Diversion	10/04/12	0.7	Orleans RD
In Stanshaw Creek 40 ft upstream of pond	10/04/12	0.4	Orleans RD

Stanshaw Creek – Discussion and Streamflow Recommendations:

While both juvenile coho salmon and steelhead have been documented in Stanshaw Creek, the creek's moderate channel slope and relative lack of suitably-sized substrate diminishes its importance as a significant spawning stream within the Klamath River watershed. However, the off-channel pond located at Stanshaw Creek's confluence with the Klamath River provides excellent habitat for both summer and winter rearing of non-natal coho salmon. In recent years, off-channel habitat in the form of beaver ponds, ox-bows and sloughs has gained recognition as a vital component in the life history strategies of coho salmon (Pollock et al. 2004). Utilization of the Stanshaw Creek pond by non-natal coho salmon was documented in a recent Humboldt State University Master's thesis (Witmore 2014). This research confirmed excellent growth rates of juvenile coho salmon that reared in the Stanshaw Creek pond. Witmore's research along with the ongoing Yurok-Karuk Coho Ecology project has demonstrated that off-channel ponds along the Klamath River corridor are extremely important habitats for non-natal coho originating from numerous upstream tributaries, including the Shasta and Scott rivers. The quantity and quality of the Klamath River's off-channel habitat may likely limit the production of coho salmon smolts, thus the identification and protection of these habitats is extremely important.

Requirements for good growth and viable rearing habitat in off-channel ponds include sufficient streamflow to: maintain good water quality in summer months, provide adequate drift of food items, and to provide connectivity between the pond and mainstem Klamath River for fish access into and out of the pond. Fish migration between the pond and the Klamath River is important in the late-spring to early-summer period and also during the fall months. Fall access is necessary for movement of age-0 coho salmon into ponds for over-wintering; whereas spring to early-summer access is necessary for the out-migration of age-1 coho salmon smolts. Access into the early summer months may also allow juvenile fish to leave a stressfully warm mainstem Klamath River for cooler water temperatures in ponds and other off-channel habitats. The HSU thesis research with PIT tagged coho salmon revealed that throughout the summer months some fish made daily movements between off-channel ponds and the main river, possibly to forage in the mainstem when it was cooler and then migrating back into the ponds during the daytime when the mainstem was warmer. Thus, maximizing pond-to-river connectivity is important to account for the wide range of life history tactics documented by the mixture of coho sub-populations utilizing off-channel habitats along the Klamath River corridor.

Development of instream flow recommendations is often an iterative process involving multiple streamflow measurements, water quality measurements, and direct observations of fish presence and habitat preference/utilization. Identification of the impacts caused by reduced flows is also necessary in making instream flow recommendations. For Stanshaw Creek, flow recommendations should address: (1) maximizing seasonal connectivity between pond and Klamath River, (2) maintenance of pond volume and water quality during summer months, and (3) maintenance of viable salmonid and benthic macro-invertebrate (BMI) habitat between Highway 96 and MMR's POD.

Flow Recommendation for Connectivity: Based on the 11/17/14 streamflow measurement just upstream of the pond, 1.3 cfs was insufficient in providing connectivity between the pond and the Klamath River. When inspected by RTA on 11/17/14, the lowest of the two outlet channels was approximately 0.1 ft higher than the pond's water surface. Preliminary recommendation is for 2.0-2.5 cfs in Stanshaw Creek, measured at pond entrance. RTA also recommends that instream flow measurements are made when sufficient connectivity exists to either confirm or fine-tune this instream flow recommendation. Seasonal connectivity flows should be achieved at least between April-June and October-November. Maintaining connectivity throughout the summer months would allow daily movements between the pond and mainstem Klamath River. RTA acknowledges that seasonal connectivity is also influenced by Klamath River discharge and the pond may be inundated at higher flows.

Flow Recommendation for Pond Maintenance: Based on discussions with the Karuk Tribal fisheries staff, extremely low flows to the Stanshaw Creek pond during the past three summers has led to reduced pond volume, poor water quality, and even direct mortality of juvenile coho salmon (Soto, pers. comm.). These observations coincided when measured flows in lower

Stanshaw Creek were less than 1.0 cfs, typically between 0.4 and 0.7 cfs. Preliminary recommendation is for 1.3-1.5 cfs in Stanshaw Creek, measured at pond entrance. RTA also recommends that instream flow measurements are made in conjunction with water quality measurements (temperature and dissolved oxygen) to either confirm or fine-tune this instream flow recommendation. Streamflow should be measured just above the pond entrance. Water temperature within the pond should be monitored hourly with data loggers and dissolved oxygen should be measured periodically throughout the summer. Stage plate readings should be made daily to track changes in pond volume.

Flow Recommendation for Salmonid and BMI Habitat: Currently, the MMR bypasses all non-consumptive water from Stanshaw Creek into Irving Creek. This practice has a detrimental effect to the entire reach of Stanshaw Creek below the POD by reducing instream habitat of resident coastal rainbow trout, juvenile steelhead, juvenile coho salmon and BMI productivity. Reduced BMI productivity may ultimately affect the growth of coho salmon residing in the off-channel pond and in lower Stanshaw Creek (up to the Highway 96 crossing). Reduced flows in Stanshaw Creek also increases travel time of water moving downstream, potentially increasing thermal loading before entering the pond. Reduced flows may also impact the drift of BMI from the creek into the pond, a potentially important food source for juvenile coho residing in the pond. The MMR also temporarily stores diverted Stanshaw Creek water in a pond before releasing into Irving Creek. During the summer, this practice most likely results in a thermal loading of the water prior to release. RTA recommends that all non-consumptive water diverted by the MMR is returned to Stanshaw Creek at the highest location feasible within Stanshaw Creek. Efforts should also be made to minimize thermal loading of this return flow.

Additional Recommendations:

1. Installation of a control gate at the POD so that MMR diverts only their allocated flow. Control gate should also provide the downstream channel its required minimum flows as a priority over the MMR diversion. Diversion at POD should be properly screened.

2. Implement water conservation measures such as: enclose MMR’s diversion in a pipe instead of an open ditch, relocate POD farther upstream to create more drop or head pressure, upgrade MMR’s hydropower system to a more efficient system, consider other sources of power generation (such as solar during summer when flows are low).

3. Enforcement of existing CDFW code #5937 and implementation of SWRCB’s Water Code section 1259.4. State and federal agencies should require the MMR to follow existing codes and regulations regarding minimum streamflow requirements so that the MMR’s diversion avoids causing indirect and direct take of an ESA-listed fish species.

Literature Cited

Pollock, M.M., G.R. Pess, and T.J. Beechie. 2004. The importance of beaver ponds to coho salmon production in the Stillaguamish River Basin, Washington, USA. North American Journal of Fisheries Management 24: 749-760.

Witmore, S.K. 2014. Seasonal growth, retention, and movement of juvenile coho salmon in natural and constructed habitats of the mid-Klamath River. Master's Thesis, Humboldt State University.

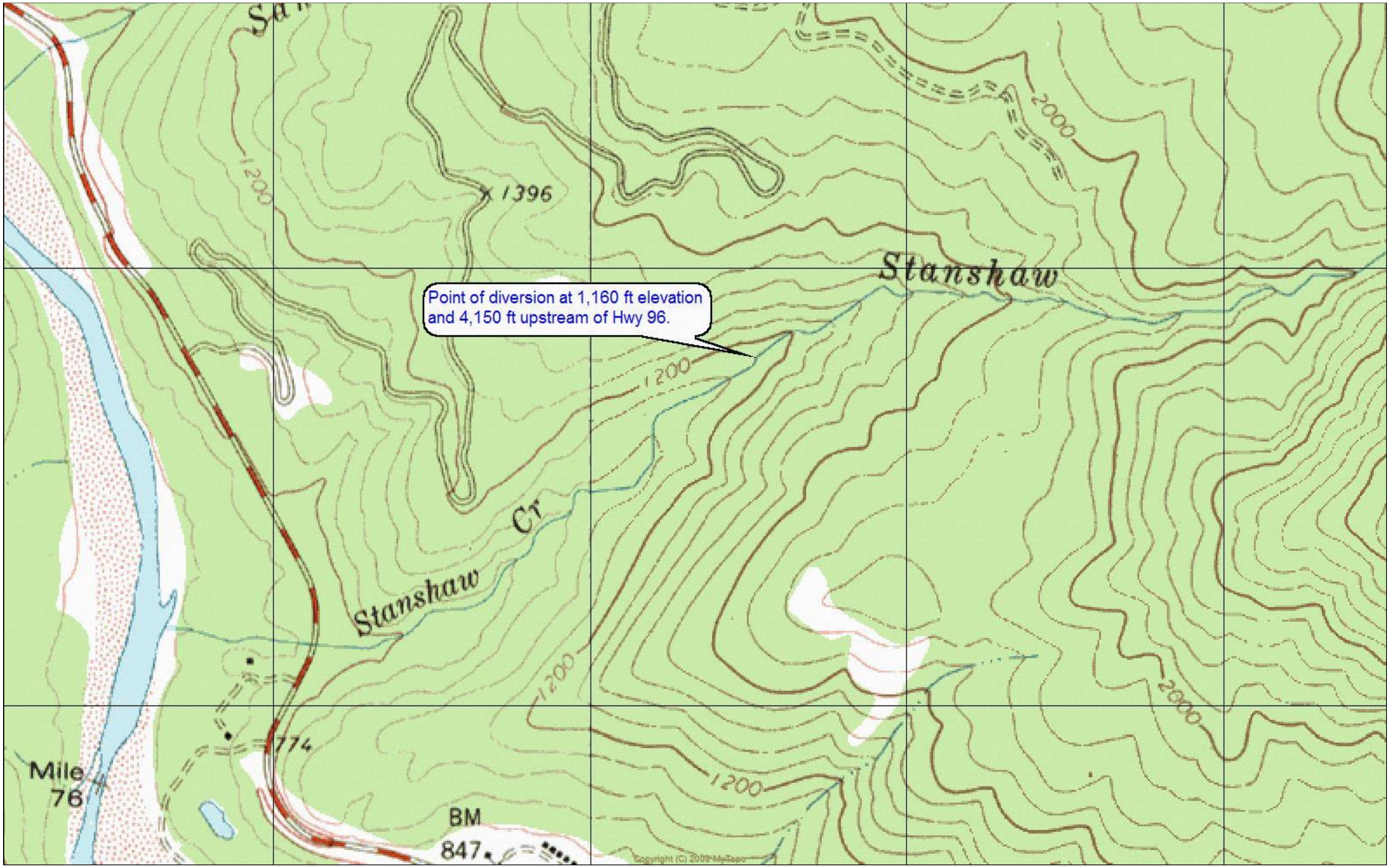


Figure 1. Stanshaw Creek and location of the Marble Mountain Ranch's point of diversion.

APPENDIX A: HABITAT TYPING SPREADSHEET

STANSHAW CREEK - RTA HABITAT ASSESSMENT 11/17/2014

RIFFLE/STEP-POOLS # OF PACES	RIFFLE/STEP CONVERTED DISTANCE (2.5 FT per PACE)	POOL/FLAT UNIT LENGTH (FT)	CUM. DISTANCE (FT)	POOL/FLAT HABITAT UNIT TYPE	AVERAGE WETTED WIDTH (FT)	MAXIMUM DEPTH (FT)	TAILWATER CONTROL DEPTH (FT)	RESIDUAL DEPTH (FT)	SPAWNING SUBSTRATE (FT^2)	COVER QUALITY	COVER ELEMENTS	COMMENTS AND OBSERVATIONS
44	110											
		12.1	122.1	MCP	6.6	2.0	0.3	1.7	0	FAIR	U/C BK, BOULDERS	
66	165											
		13.4	300.5	RUN	7.0	1.0	0.4	0.6	0	POOR	SM BOULDERS	
32	80											
		12.1	392.6	MCP	8.5	1.5	0.5	1.0	0	FAIR	LWD, BUB CURT.	PLUNGE AT TOP OF UNIT = 0.7 FT
45	112.5											
		12.7	517.8	MCP	8.4	1.6	0.4	1.2	0	FAIR	SM BOULDERS, BUB CURT.	PLUNGE AT TOP OF UNIT = 1.1 FT
15	37.5											
		11.6	566.9	DMP	8.5	1.1	0.3	0.8	0	POOR	SM BOULD	TAILWATER LOOKS LIKE PLACED ROCKS
5	12.5											
		21.4	600.8	DMP	11.5	2.8	0.4	2.4	0	GOOD	BOULDERS, BUB CURT, LWD	DROP AT TAILWATER = 1.7 FT
7	17.5											
		11.3	629.6	PLP	6.8	1.5	0.4	1.1	0	FAIR	BOULDERS, BUB CURT.	PLUNGE DROP = 0.7 FT
33	82.5											
		12.2	724.3	PLP	8.0	1.3	0.2	1.1	15	GOOD	BOULDERS, BUB CURT, LWD	PLUNGE DROPS: LB = 4.2 FT; RB = 2.5 FT
9	22.5											
		26.5	773.3	MCP	12.6	1.0	0.3	0.7	20	FAIR	SM BOULDERS	SOME BACK-WATERING FROM PREVIOUS UNIT
33	82.5											
		14.8	870.6	MCP	11.7	1.9	0.3	1.6	0	FAIR	BOULDERS, BUB. CURT.	PLUNGE AT TOP OF UNIT = 1.1 FT
76	190											
		11.3	1071.9	PLP	9.2	2.2	0.4	1.8	0	FAIR	BOULDERS, BUB CURT.	PLUNGE AT TOP OF UNIT = 1.8 FT
70	175											
		16.2	1263.1	PLP	18.7	2.1	0.4	1.7	0	POOR	SM BOULDERS	OUTLET POOL OF HWY 96 CULVERTS
		123.0	1386.1	CULVERT	18.0	N/A	N/A	N/A	N/A	N/A	N/A	TWO ARCHES, SPAN=9FT X RISE=6.5FT. CON.FLOOR AND WALLS
10	25											
		16.5	1427.6	MCP	16.5	2.0	0.4	1.6	0	POOR	SMALL BOULDER	CASCADE INTO POOL = 8-10 FT DROP OVER 32.5 FT DISTANCE
25	62.5											
		10.5	1500.6	PLP	7.8	1.6	0.3	1.3	0	GOOD	BOULDERS, BUB CURT, LWD	OBSERVED SALMONID, 8-10" TROUT
30	75		1575.6									TRIB ENTERS FROM LB, APPROX. 30% OF FLOW
11	27.5											
		10.5	1613.6	MCP	9.2	1.3	0.4	0.9	0	POOR	BUB CURTAIN	DROP AT TOP OF UNIT = 3.5FT
17	42.5											
		11.7	1667.8	PLP	7.3	1.6	0.4	1.2	0	POOR	BUB CURTAIN	DROP AT TOP OF UNIT = 3.5FT
8	20											
		18.5	1706.3	MCP	11.8	1.7	0.3	1.4	0	FAIR	BOULDERS, BUB. CURT.	ACTIVELY SCOURED CHANNEL WIDTH = 17FT
27	67.5											
		16.5	1790.3	DMP	11.6	1.7	0.4	1.3	0	FAIR	BOULDERS, BUB. CURT.	FORMED BY BOULDER/LWD JAM W/1.8 FT DROP TO D.S. RIFFLE
87	217.5											
		15.9	2023.7	PLP	8.2	1.6	0.3	1.3	0	POOR	BOULDER, BUB. CURT.	RIPARIAN DENSIO. MEASUREMENT:10,12,13,14 = 73.5%
19	47.5											
		12.4	2083.6	MCP	9.2	1.4	0.4	1.0	0	POOR	BOULDERS	ACTIVELY SCOURED CHANNEL WIDTH = 37FT
20	50		2133.6									DIVERSION DRUM ON RB SIDE WITH OVERFLOW INTO CREEK
35	87.5		2183.6									
		18.3	2289.4	MCP	9.2	1.5	0.3	1.2	0	POOR	BOULDERS	PIPE IS LAID DOWN THE CHANNEL W/DIAMETER = 0.2 FT
13	32.5		2321.9									SCREENED INTAKE
68	170		2491.9									RB HILLSLOPE FAILURE, CHANNEL CONSTRICTED W/MATERIAL
75	187.5											
		15.1	2694.5	MCP	9.8	1.4	0.3	1.1	0	GOOD	BOULDERS, BUB. CURT.	TOOK PHOTO, OVERHANGING BOULDER = GOOD COVER
67	167.5											
		15.5	2877.5	PLP	10.8	1.7	0.3	1.4	12	FAIR	BOULDERS, BUB. CURT.	GOOD SPAWNING AREA, DROP AT TOP OF UNIT = 1.6FT
36	90											
		8.5	2976.0	PLP	22.5	1.4	0.3	1.1	0	POOR	BUBBLE CURTAIN	PLUINGE = FULLY-SPANNING LOG WITH DROP OF 3.5 TO 4.2 FT
32	80											
		16.5	3072.5	PLP	8.8	2.6	0.3	2.3	9	GOOD	BOULDERS, BUB. CURT.	OVERHANGING BOULDER ON RB = GOOD COVER
42	105											
		10.5	3188.0	PLP	7.8	1.7	0.3	1.4	0	FAIR	BOULDERS, BUB. CURT.	
71	177.5											
		17.5	3383.0	PLP	9.4	1.3	0.3	1.0	15	POOR	SEVERAL BOULDERS, OPEN	SPAWNING SUBSTRATE = MOSTLY GRAVELS, THEN COBBLES
40	100		3483.0									TO CASCADE W/6-7 FT DROP OVER APPROX. 30 FT DISTANCE
36	90		3573.0									TO DROP = 3.8 TO 4.4 FT W/1.3 FT DEPTH AT BASE OF DROP
87	217.5		3790.5									TO OBVIOUS < CHANNEL CONFINEMENT AND > CHANNEL SLOPE
128	320		4110.5									TO BOULDER CASCADE W/7-8 FT ELEVATION DROP OVER 30-35 FT
28	70		4180.5									CONDUCTED TIMED FLOAT TO ESTIMATE STREAMFLOW
60	150		4330.5									END OF SURVEY AT FULLY SPANNING LOG W/4 FT DROP

Stanshaw Creek Coho Habitat Enhancement Project

FRGP Grant Number: P1110319

Mid Klamath Watershed Council

P.O. Box 409 Orleans, CA 95556, (530) 627-3202

Author Information: Charles Wickman, Fisheries Program Co-director, Mid Klamath Watershed Council, charles@mkwc.org, (530) 627-3202

Overview of Project:

Project Description

This project successfully restored approximately 4,500 square feet of high quality coho rearing habitat at the mouth of Stanshaw Creek (Latitude 41.477, Longitude -123.512). Approximately 560 cubic yards of gravel and rock were removed from the head of an existing pool, restoring and enhancing the pre-2006 form and function of this heavily utilized off-channel rearing habitat. Originating from Stanshaw Creek, the bulk of the sediment plug was deposited during the 2005/2006 flood event when the upstream ditch diversion to Marble Mountain Ranch overtopped causing severe gully erosion. In addition, chronic wasting of Stanshaw Creek's banks, adjacent to the Fisher driveway below the Highway 96 culverts, continued to deposit material into the pool. Wood structures installed through this project at the head of the pool are functioning to direct this material away from the pond while maintaining Stanshaw Creek's important cold water contribution to the habitat. Implementation of this project type has been identified as a priority action in the Recovery Strategy for California Coho Salmon (CDFW 2004), and the Middle Klamath Subbasin Fisheries Resource Recovery Plan (Karuk Tribe 2006).

Construction Activities

Prior to construction of the project, MKWC Fisheries staff installed two rows of silt fencing across the existing pool, excluding the wetted portion of the pool, and its fish, from the construction area. After isolating the construction area, MKWC staff constructed a piped diversion of Stanshaw Creek's flow (approximately .24 cfs) around the construction area and into the existing wetted portion of the pool*. The Karuk Tribe Fisheries Program (KTFP) assisted MKWC Fisheries staff with relocating fish, amphibians and aquatic insects form the 100' of diverted channel and to an approved location above the point of diversion. Fish screens were installed at the top and bottom of the diversion pipe.

Construction of the project began on September 10, 2013 and was complete by September 16, 2013. Before site excavation began, a thirty foot coffer dam was constructed across the pond, parallel to the silt fencing. In addition, the contractor culled five douglas fir trees from the landowner's property and installed the log structure at the head of the pool

Approximately 560 cubic yards of material was excavated from the site with a 30,000 lb. excavator and placed in an approved fill location outside the immediate Klamath River floodplain using a ten yard dump truck. During excavation, the site was pumped with three and four inch trash pumps to reduce turbidity and facilitate an accurate adherence to the design specs. Pumped water was deposited 300' from the work site in an approved location on the Klamath River floodplain. . On September 16, the contractor decommissioned the access road, completing construction activities.

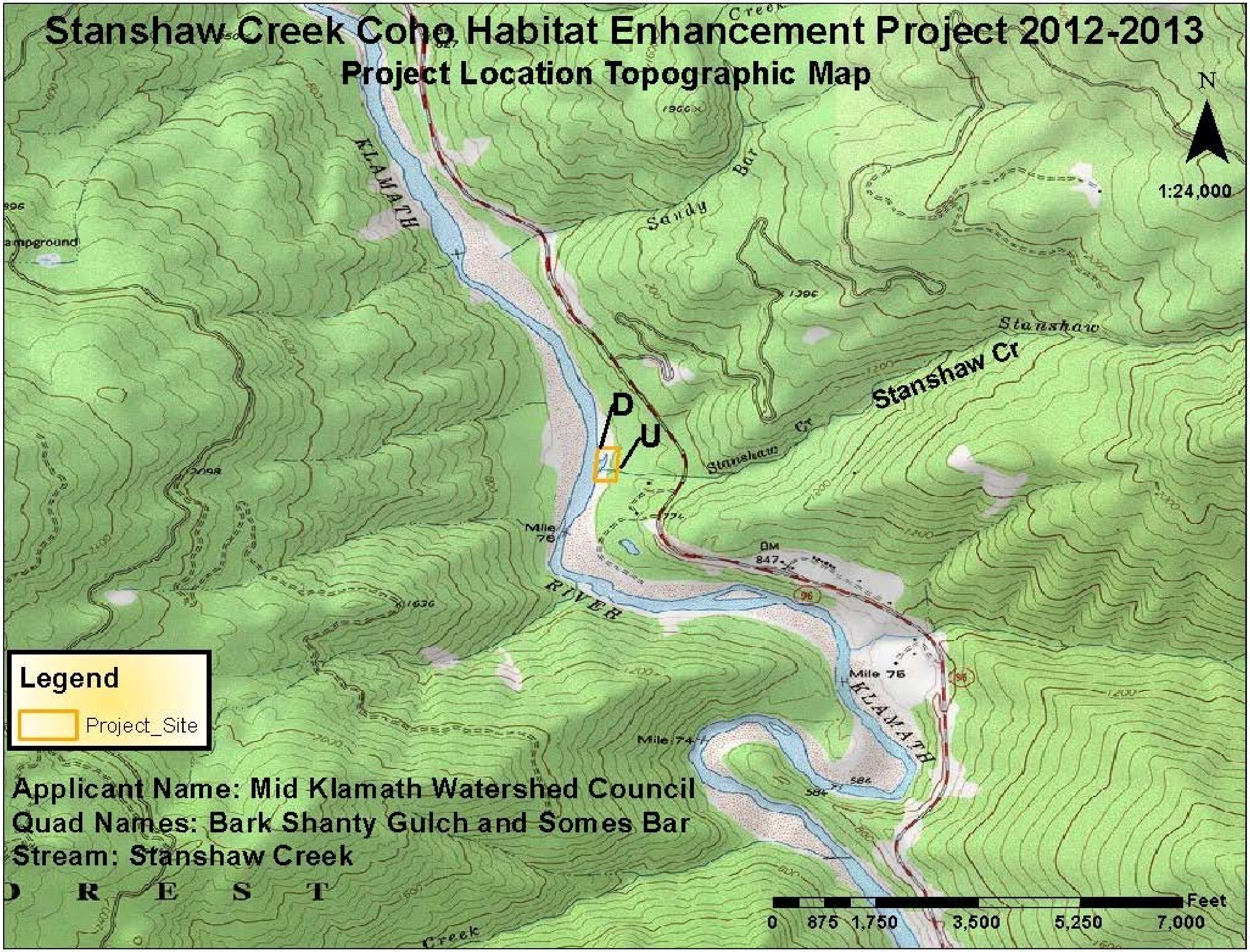
On September 30, the Karuk Tribe Watershed Program hydroseeded the access road and fill site with a native grass mix, and MKWC staff spread weed free straw over all seeded areas.

The coffer dam was removed by MKWC staff on September 19 and after letting the turbidity to settle out of the construction area, the silt fencing and diversion pipe was removed on September 30.

Monitoring

Monitoring of this project has included biological (fish counts), water quality (temperature and dissolved oxygen) and structural. KTFP has and will be conducting coho population estimates at this site four times each year. The first estimate was conducted over the period of February 25 -27, and estimated 105 juvenile coho utilizing the pool. Historically, this habitat has functioned as Klamath River edge unit, high flow refuge during the winter and spring, and retains fish utilizing this habitat on into the high temperature summer and fall months, when the pool is utilized as thermal refugia. Higher river flow events in March, and subsequent fry dispersal, may have added a significant number of fish to this habitat. KTFP will be performing another population estimate in May or June of 2014. MKWC fisheries technicians will be performing bi-weekly temperature and dissolved oxygen monitoring with a handheld YSI unit, and continuous temperature data is being collected in the pond, the Klamath River above the site, and Stanshaw Creek above the site. Site visits and photographs are used to monitor and record the structural integrity and function of the pond during high flow events.

Final Budget: Attached at end of document


Stanshaw Creek Coho Habitat Enhancement Project 2012-2013
Project Location Topographic Map
N
1:24,000
KLAMATH
Sandy Bar
Stanshaw
Stanshaw Cr
D
U
Stanshaw Cr
Mile 76
RIVER
Mile 75
KLAMATH
Mile 74
Legend
Project_Site
Applicant Name: Mid Klamath Watershed Council
Quad Names: Bark Shanty Gulch and Somes Bar
Stream: Stanshaw Creek
0 875 1,750 3,500 5,250 7,000
Feet

Post Project Profile: N/A

Performance Measures:

- **Total miles of instream habitat treated;**

.02 miles of habitat was treated.

- **If the project is for channel reconfiguration and connectivity, select from:**
    - **Type of channel reconfiguration and connectivity, select from: Creation/connection to off-channel habitat; creation of instream pools; channel bed restored; or meanders added;**

Creation/connection to off-channel habitat

- - **Miles of stream treated for channel reconfiguration and connectivity;**

.02 miles of stream was treated for connectivity to off-channel habitat.

- - **Miles of off-channel stream created;**

N/A

- - **Number of instream pools created for channel reconfiguration;**

N/A

- **If project is for channel structure placement:**
    - **Type of materials used for channel structure placement, select from: Individual logs (unanchored); logs fastened together (logjam); Rocks/boulders (unanchored); rocks/boulders (fastened or anchored); Stumps with rootwads attached (rootwads); weirs; deflectors/barbs; or other engineered structures;**

Unfastened logs (30' of stem with rootwad attached) were woven into existing vegetation at the top of the pond. Washed, onsite river rock was used as ballast between logs.

- - **Miles of stream treated with channel structure placement;**

.005 miles was treated with structure placement adjacent to Stanshaw Creek.

- - **Number of instream pools created by structure placement;**

N/A

- **Number of structures placed in channel;**

N/A; Structure was placed outside the active channel.

- **If the project is for spawning gravel placement:**

N/A

- **If the project is for removal of aquatic non-native invasive plants:**

N/A

- **If monitoring was included in the project:**
  - **Type of monitoring, select from: implementation monitoring; compliance monitoring-engineering design; compliance monitoring-project design; pre-treatment monitoring; post treatment monitoring; salmonid monitoring; non-salmonid biological monitoring; water flow monitoring; or physical monitoring;**

Implementation monitoring included oversight of all construction activities to ensure the contractor was meeting design objectives and permit compliance; pre-treatment and post treatment monitoring included photo monitoring form preselected photo points; salmonid monitoring includes periodic population estimates performed by the Karuk Tribe Fisheries Program; water flow monitoring will include weekly flow measurements in the summer and fall (June – October).

- **Location of monitoring, select from: onsite; upstream; downstream; or upslope.**

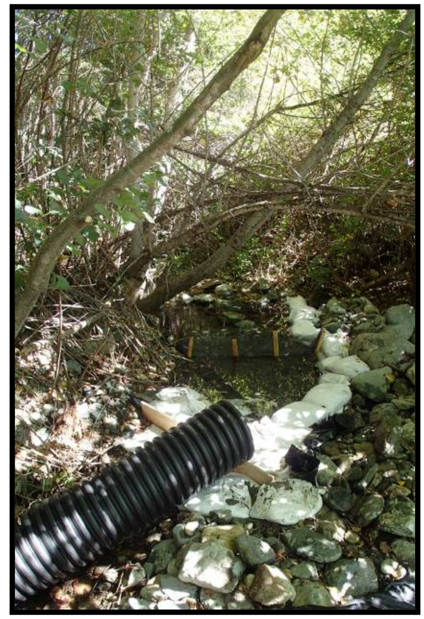
Onsite.

Project Photos:

File Name	Date	Subject/Site Name	Description	Standing	Facing
Figure 1	9/10/2013	Access Road	Before	Top of Road	West
Figure 2	9/10/2013	Access Road	After	Top of Road	West
Figure 3	9/12/2013	Access Road	After	Top of Fill Site	North
Figure 4	9/11/2013	Coffer Dam	During Construction	Eastern Edge of Pond	North
Figure 5	9/11/2013	Coffer Dam	Completed	Eastern Edge of Pond	North
Figure 6	9/15/2013	Diversion	Before	Below Point of Diversion	East
Figure 7	9/9/2013	Diversion	After	Below Point of Diversion	East
Figure 8	9/9/2013	Diversion	Piping	Center of Pond	East
Figure 9	9/9/2013	Log Structure	Before	Bottom of Access Road	North
Figure 10	9/10/13	Log Structure	After	Bottom of Access Road	North
Figure 11		Completed Pond	Completed Pond	Bottom of Access Road	North
Figure 12	6/12/2012	Gravel Plug	Before	Bottom of Pond	North
Figure 13	9/30/2013	Gravel Plug	After	Bottom of Pond	North

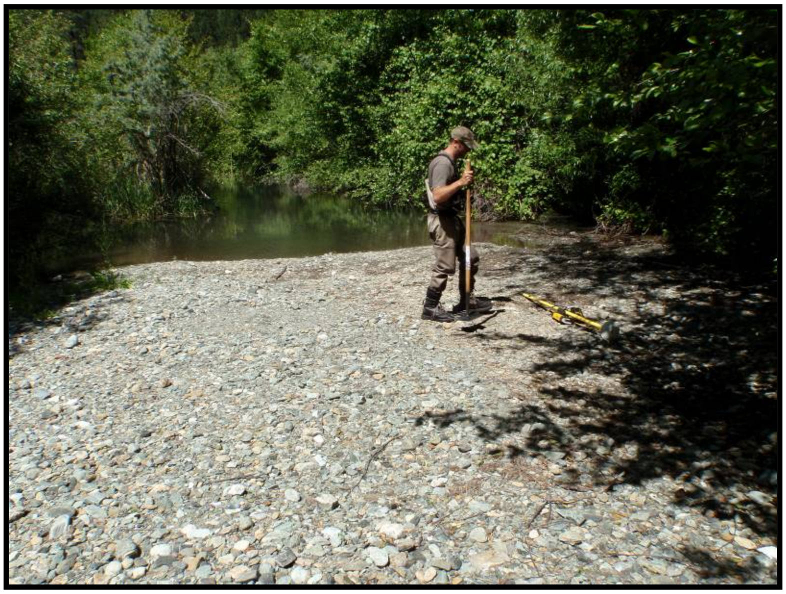
A 200 foot access road was constructed between an extisting roadway and the project site, across the Klamath River floodplain. This access road was seeded and mulched after project construction was completed. Images above left and right show the access road from the top, before and after construction. Below, the perspective show's a more complete view of the access road from the top and across the river floodplain.

Before excavation began, a thirty foot coffer dam was constructed using 10mm plastic wrapped around washed gravel. This coffer dam excluded all mechanical construction activities from the existing pool habitat. Once construction activities were complete the dam was manually dismantled.



Prior to construction activities, it was necessary to divert a small amount of Stanshaw Creek's flow around the project area. The point of diversion was located at the top of Stanshaw Creek's active delta (above left and right), and 120' of 16" flexible tile was used to reroute approximately .24 cfs of water around the site and into the existing pool habitat, assuring a cold water connection to this habitat (below). The "head gate" was constructed using a plywood splash board, sand bags, and 1/8' screening both on the end of the tile and across the stream bed, approximately 6' above the diversion.

Five 30' logs with rootwads attached were locked into existing vegetation at the head of the off-channel pool, designed to redirect sediment around the project area in high flow events. The upper left and right photos show a close up, before and after, of the log placement, while the photo below shows the structure in relation to Stanshaw Creek and the off-channel habitat during winter flows.



Approximately 560 cubic yards of gravel, rock and sand was removed form the site, more than doubling the volume of off-channel habitat. Photos taken before and after (above and below) illustrate the quality and quantity of habitat restored through this project.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

August 3, 2016

Refer to NMFS No: 150307WCR2016AR00269

Barbara Evoy, Deputy Director
Enforcement Unit 5, Division of Water Rights
State Water Resources Control Board
1001 I Street, 14th Floor
Sacramento, California 95814

Dear Ms. Evoy:

Thank you for requesting technical assistance from NOAA's National Marine Fisheries Service (NMFS) to develop a flow recommendation for Stanshaw Creek that will protect listed coho salmon and their habitat and other important aquatic ecosystem functions. Stanshaw Creek, a tributary to the Lower Klamath River, supports Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) evolutionarily significant unit (ESU) (70 FR 37160, June 28, 2005) and SONCC coho salmon ESU critical habitat (64 FR 24049, May 5, 1999) designated under the Endangered Species Act (ESA) (Figure 1). Stanshaw Creek is a critical cold water tributary to the Klamath River. Protecting low flow has been identified in the SONCC coho salmon recovery plan as a priority in the Klamath River for coho salmon recovery (NMFS 2014). In addition to listed coho salmon, Stanshaw Creek also supports amphibians and other aquatic life.

In 2001, NMFS submitted a water right protest to the California State Water Resources Control Board, Division of Water Rights (Division of Water Rights) in response to the Marble Mountain Ranch application for an appropriative water right from Stanshaw Creek. The NMFS protest letter identified a minimum bypass flow protective of coho salmon and their critical habitat. Since the original application and NMFS protest, the Division of Water Rights completed the *Division of Water Right Report of Inspection, Registration: D030945*. The inspections occurred on December 17, 2014 and February 12, 2015. The Division of Water Rights investigated the water right and found that the Marble Mountain Ranch has a pre-1914 right to divert up to 3.0 cubic feet per second (cfs). In addition to this finding, the Division of Water Rights also described the Marble Ranch diversion as "a potential waste and unreasonable use of water, an unreasonable method of withdrawal, and a harm to public resources." The Division of Water Rights requested assistance from the California Department of Fish and Wildlife and NMFS to establish a bypass flow on Stanshaw Creek that is protective of listed coho salmon and riparian ecology, both of which are considered Public Trust Resources.

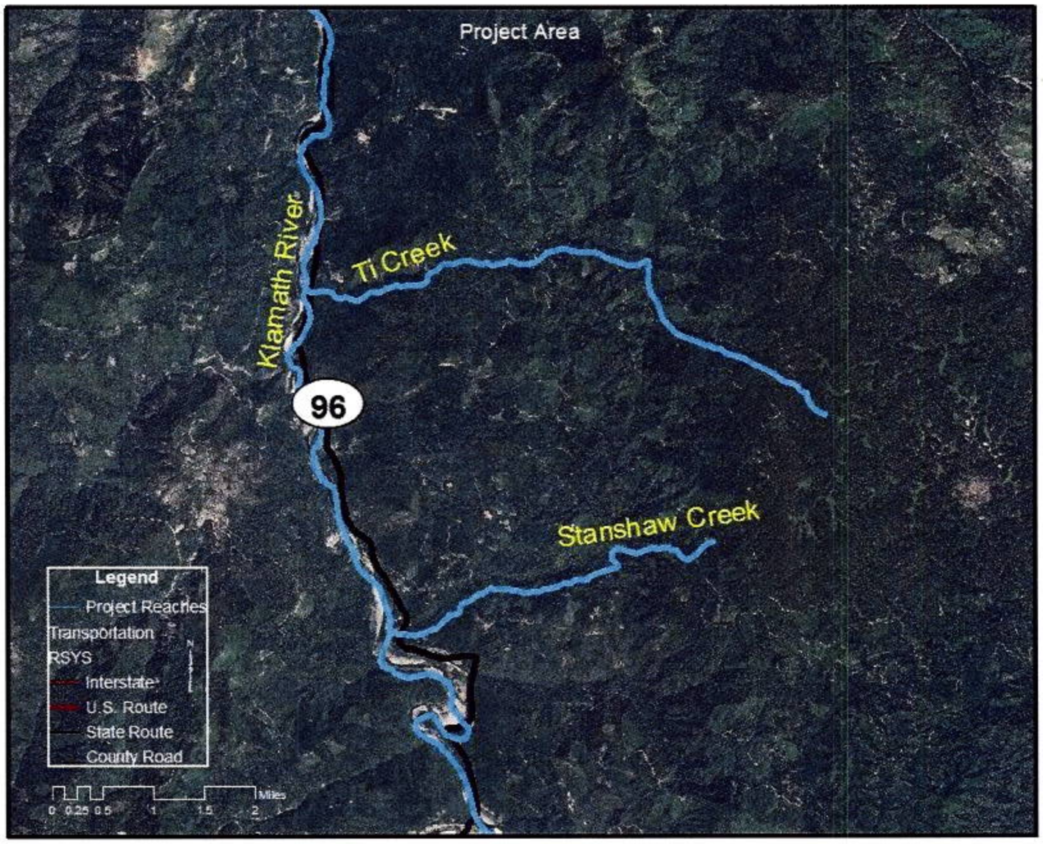


Figure 1 Stanshaw Creek Diversion Project Area.

Importance of Stanshaw Creek Flows to Coho Salmon and Stream Ecology

Juvenile coho salmon and other salmonids in the Klamath River rely on the cold water refugia provided by off channel habitat and tributaries such as Stanshaw Creek (NMFS 2014). When the mainstem Klamath River temperatures rise and flows recede, juvenile coho salmon seek cooler off-channel habitat where they may remain throughout the warm season (May through October). The off-channel pond at the Stanshaw Creek confluence with the Klamath River provides important rearing habitat for juvenile coho salmon, as well as for Chinook salmon and steelhead. In the Klamath River, mainstem temperatures can range from 21 – 27 °C in July and August with daily extremes as high as 29.5 °C (Belchick 1997, Bartholow 2005). Preferred temperature ranges for juvenile coho salmon rearing have been reported from 11.4 - 14.6 °C (Brett 1952, Coutant 1977, Beschta *et al.* 1987) with lethal temperatures occurring at 25.8 °C (Beschta *et al.* 1987) and cessation of growth at a temperature of 20.3 °C (Brett 1952, Reiser and Bjornn 1979). Besides directly causing physiological stress, elevated water temperatures in the Klamath River are correlated with an increased prevalence of diseases, including *Ceratonova shasta,* that cause mortality in Klamath River coho salmon (Hallett *et al.* 2012, Ray *et al.* 2012)

The flow volume in Stanshaw Creek is important during the late spring and summer to provide attraction flow and access for juvenile coho salmon and other salmonids to cold water refugia. Access to tributaries becomes increasingly important as water temperatures in the Klamath River begin to reach levels that cause stress and limit juvenile coho salmon growth, typically starting in mid-May and continuing through October (Bartholow 2005, Belchik 1997). Water temperatures lethal to coho salmon and other salmonids occur in the mainstem Klamath River in July and August, reaching exceedence levels of over 50 percent (Asarian 2013). As such, coho salmon and other salmonids need access to cold water tributaries before the mainstem water temperature reaches stressful or lethal levels if they are to survive in the Klamath River.

The connectivity between the Klamath River and the off-channel pond and stream is most important to coho salmon in this warm transition period, but coho salmon may continue to use the mainstem Klamath River for feeding opportunities even as the mainstem reaches lethal levels during some portions of the day. Witmore (2014) documented a daily migration pattern of juvenile coho salmon from Tom Martin Creek (a coldwater tributary) into the mainstem Klamath River, presumably to access food resources. This migration pattern continued throughout the summer as flows from Tom Martin Creek created a cold water plume in the mainstem Klamath River.

In addition to access to Stanshaw Creek, streamflow from Stanshaw Creek is important for coho salmon after flows recede below the point of connectivity to the Klamath River. The low flow in Stanshaw Creek maintains the off-channel pool water quality and provides a source of food supply to the pool.

Stanshaw Creek Stream Flow Estimate

The Stanshaw Creek watershed is almost 100% forested and flows in a westerly direction to its confluence with the Klamath River. The watershed area is 4.3 square miles above the confluence with the Klamath River and approximately 4.0 square miles above the point of diversion (POD). A diversion ditch runs from the POD on Six Rivers National Forest land to the Marble Mountain Ranch. Stanshaw Creek is ungagged, therefore, the low flow hydrograph was estimated by correlation with USGS hydrographic data for Ti Creek, located in a 9.46 square mile watershed to the east of Stanshaw Creek. The streams are expected to have a similar hydrologic response because of their similar size, elevations, vegetation, geology, soil type, and both flow in a westerly direction into to the Klamath River.

Daily average stream flow for Stanshaw Creek was estimated by prorating the Ti Creek flow data with the proportional watershed area (*i.e.*, $Q_{Stanshaw} = Q_{Ti} \times \frac{Area\ Stanshaw}{Area\ Ti}$). Table 1 lists the estimated minimum 7-day average flow for each low flow month and year. Based on this calculation, Stanshaw Creek has an estimated average annual flow of 10.1 cfs and an average 7-day minimum low flow of 2.6 cfs at the point of the Marble Mountain Ranch diversion. The lowest flow typically occurs in October though the estimates show that streamflow begins to recede toward low flow as early as May and the lowest flow may occur as late as November.

Table 1 Stanshaw Creek annual minimum 7-day average streamflow estimates based on prorating the Ti Creek flow data by proportional watershed area.

Minimum of 7-day average per year						
month	1960	1961	1962	1963	1964	Min. for month
May		11.3	4.7	14.1	7.6	4.7
June		6.3	4.6	8.9	5.2	4.6
July		4.2	3.2	5.7	3.9	3.2
August		3.5	2.8	4.3	3.3	2.8
September		3.2	2.5	3.9	2.7	2.5
October	2.4	3.2	1.5	3.5		1.5
November	2.7	3.7	1.3	4.9		1.3
December	5.1	4.7	9.1	8.0		4.7
Min. for year	2.4	3.2	1.3	3.5	2.7	1960-1964 Overall min. = 1.3 cfs Average annual min. =2.6 cfs

The Ti Creek daily streamflow record used for these estimates spans only four years (WY 1961-1964). Therefore, the Ti Creek data was further assessed to ensure that the period of record for Ti Creek did not represent an abnormal period of record for stream flow.

The water year type during the 1960 through 1964 period was evaluated by comparing to the full record of nearby longer term gages that included the many years before and after the 1960-1964 period. The gages used for comparison and their period of record are listed in Table 2.

Table 2 Period of record of long term gages near Stanshaw and Ti Creek.

USGS Stream gage	Period of record evaluated
# USGS 11521500 INDIAN C NR HAPPY CAMP CA	1957-2014
# USGS 11523000 KLAMATH R A ORLEANS	1927-2015
# USGS 11522500 SALMON R A SOMES BAR CA	1929-2015

Figure 2 shows the annual minimum 7-day average flow per square mile for the available stations. The figure includes the Stanshaw Creek estimates for 1960-1964. The data indicate that watershed area is negatively correlated with low-flow per square mile where there is a higher minimum flow per square mile in the smaller watersheds. The watershed area of Ti Creek is two orders of magnitude smaller than Indian Creek, which is reflected in the much higher minimum flows per square mile. Despite the differences in minimum low flow based on watershed size, the low flow for the all gages follow a similar pattern from year to year which helps verify that the streams have a similar hydrologic response based on the water year type. Redwood Creek, which is located on the coast of Northern California near Orick, is included on the figure to show that inland Klamath River streams have a higher and more constant low flow per square mile than the coastal streams.

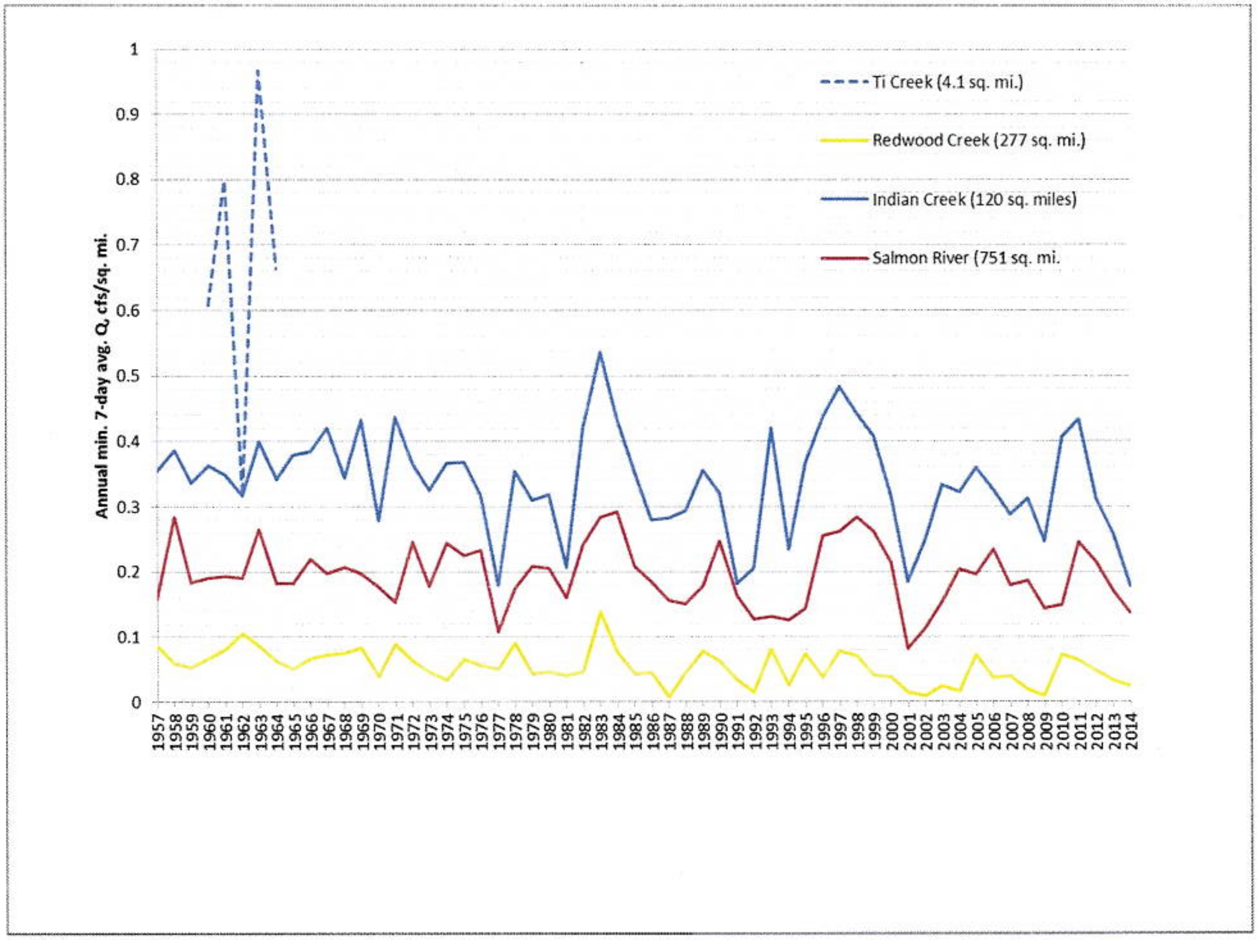


Figure 2 Comparison of annual minimum of 7-day average flow per square mile.

Flow duration curves were developed for the annual minimum 7-day average flow for each of the gages (Figure 3). The annual minimum 7-day average stream flows for 1960 through 1964 period are highlighted on each duration curve, and show the 1960 through 1964 period represents a range of moderate years in the low flow season. A flow duration curve for Redwood Creek is included on

Figure 3. Redwood Creek is located in the coastal range where snow has a much smaller effect on the hydrology and the geology is different. The figure helps verify that the hydrologic response of the inland streams is relatively similar, while the coastal Redwood Creek is different. The inland gages tend to have less variation at low flow from year to year. Figure 2 and Figure 3 work together to demonstrate that Stanshaw Creek has a similar hydrologic response as the other Klamath River watershed gages and that the 1960-1964 period represent moderate flow years and not an abnormal period of record.

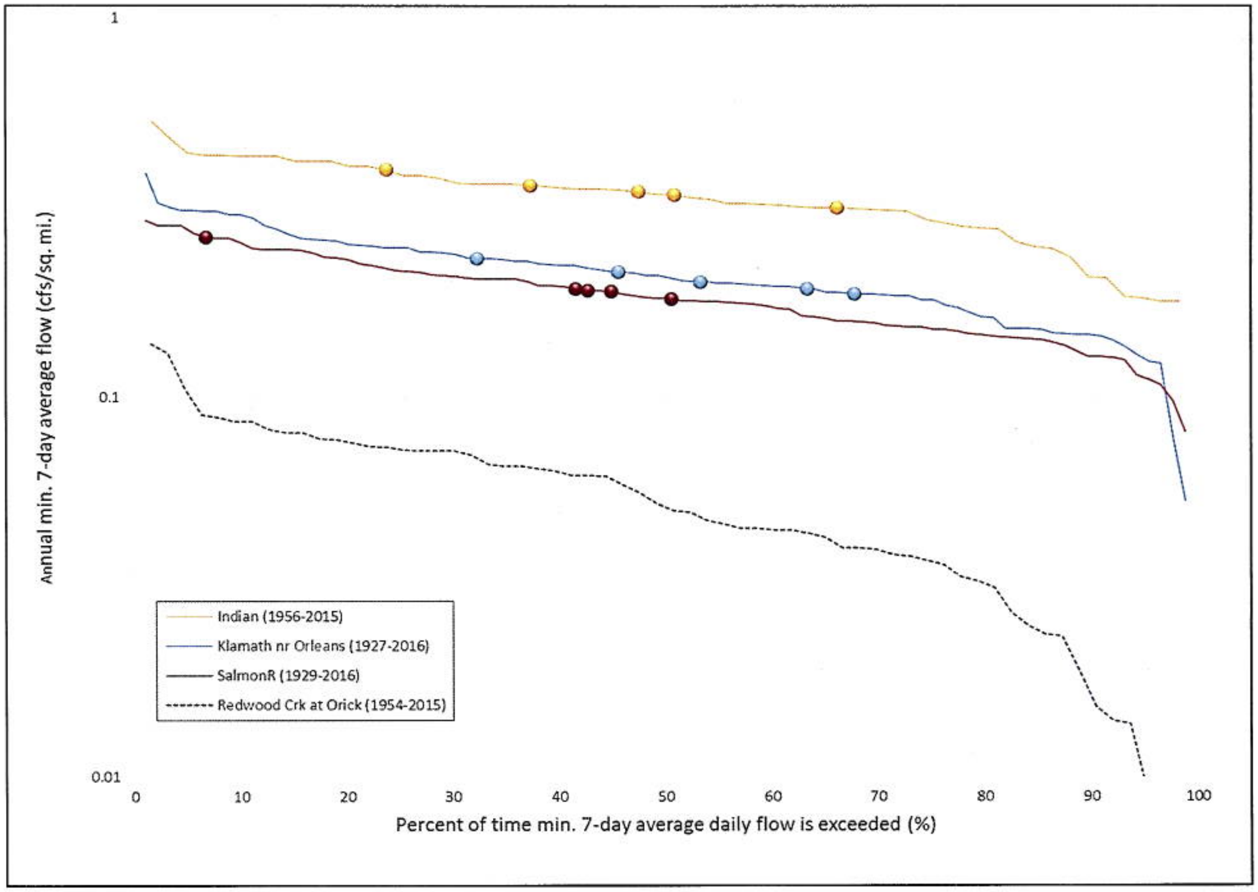


Figure 3 Annual Minimum 7-day average exceedence curves for long-term stream flow gages near Stanshaw and Ti Creek with years 1960-1964 marked.

Streamflow was measured in Stanshaw Creek several times from 2001-2014 above the POD (Table 3). Flow measurements were taken during low flow, but not necessarily at the lowest flow of the year. Two measurements were taken in 2012 showing a 0.5 cfs recession from September to October. Assuming recession at this rate from September to October, the lowest annual minimum flow for Stanshaw Creek in 2003 would have receded to 1.9 cfs, and the average of the years measured would have been 2.2 cfs. The average and minimum of the measured values are similar to the calculated average of 2.6 cfs and minimum of 1.3 cfs for Stanshaw Creek shown in Table 1 when using Ti Creek as a reference stream. The minimum flows of Salmon River and Indian Creek for each year from 2001 through 2014 are shown in Figure 4. From the Indian Creek and Salmon River comparison in Figure 4, the measured flows from 2001-2014 likely span a full range of water year types. Therefore, NMFS is confident that using Ti Creek hydrologic data prorated by proportional watershed area provides a viable surrogate to estimate low flows for Stanshaw Creek for wet through dry years.

Table 3 Stanshaw Creek flow measurements at the POD

Date	Stanshaw Creek flow above POD (cfs)	Measured by
9/4/2003	2.4	Orleans RD
9/13/2011	3.2	Karuk
9/20/2012	2.5	NMFS
10/4/2012	2.0	Orleans RD

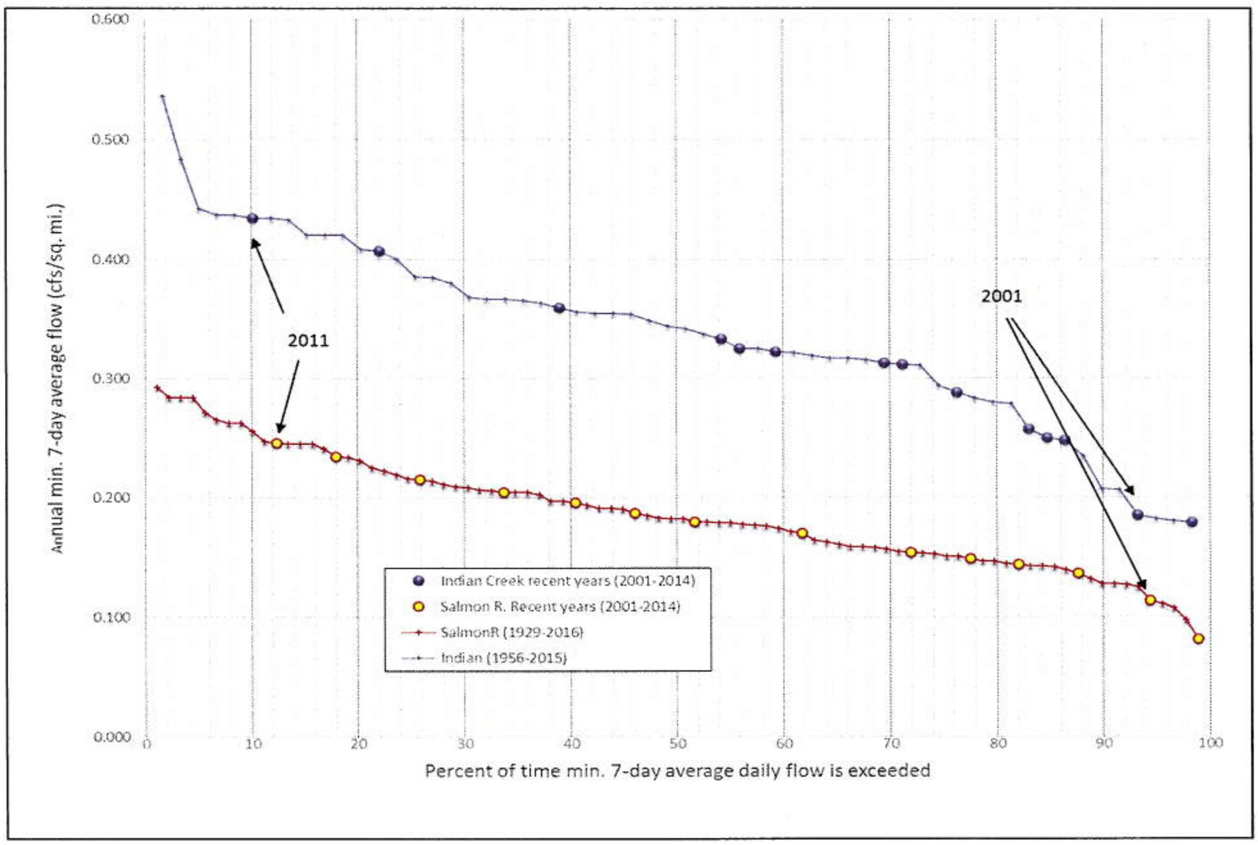


Figure 4 Data points for recent years are highlighted on the Salmon River and Indian Creek annual minimum 7-day average flow duration curve. The data show that 2001-2015 contained a full range of summer low flow from above average in 2011 to very dry in 2001.

Instream flow recommendation

The Marble Mountain Ranch diversion from Stanshaw Creek consists of both consumptive and non-consumptive use. The consumptive diversion is used to provide domestic and irrigation water for the Marble Mountain Ranch owners and business. The non-consumptive diversion is used to generate hydroelectric power. Currently, the diversion for hydroelectric generation is routed out of Stanshaw Creek watershed and discharged into Irving Creek, a tributary to the Klamath River to the west of Stanshaw Creek.

NMFS recommended bypass stream flow for the Marble Mountain Ranch diversion on Stanshaw Creek is based on an unimpaired hydrograph and includes rerouting the non-consumptive use back to Stanshaw Creek. Stanshaw Creek watershed is almost 100% forested with two small upstream diversions that State Water Board determined to be insignificant for this analysis. Based on this assumption, Stanshaw Creek streamflow just above the point of diversion is considered unimpaired for this bypass flow recommendation.

"Unimpaired hydrograph" is the term used to represent the hydrograph that should exist without diversions. The distinction between the term "unimpaired hydrograph" and the "natural hydrograph" (with no human caused alterations) is made to acknowledge that there may be human caused watershed-wide changes (*e.g*., roads, vegetation changes, human caused climate change) that have also altered the natural hydrograph, but are not in direct control by the water users.

Reductions in the various components of the unimpaired hydrograph are assumed to correspond to reductions in stream habitat (Richter *et al*. 1996, Poff 1997). While any diversion may have an impact, a diversion of only a small percentage of unimpaired flow will maintain the natural variability of the hydrograph. A variable diversion rate that maintains the natural shape of the hydrograph is preferred over a minimum bypass flow recommendation that would flatten the receding part of the annual hydrograph. Diversions that "flatline" the receding part of the hydrograph, as is the case with a single bypass flow recommendation, will negatively affect juvenile fish outmigration as well as the quality of juvenile rearing habitat when their growth rate is high. Fish size is a critical factor in coho salmon smolt survival when migrating into the ocean (*Holtby et al.* 1990).

By analyzing case studies where ecologic goals were used to set the magnitude of water diversions, Richter *et al*. (2011) found that diversions limited to 6-20% of the unimpaired flow provided protection to the riverine ecology. For a high level of protection, the study suggested a presumptive standard of no more than a 10% diversion. A high level of protection is defined as minimal change to the natural structure and function of the riverine ecosystem. Klamath River SONCC coho salmon have a critical need for the cold water refugia provided by Klamath River tributaries such as Stanshaw Creek throughout the low flow season. Any loss of cold water during this time would decrease the quality and function of habitat. Because of the critically high summer Klamath River water temperatures, NMFS recommends a bypass flow that maintains at least 90% of the unimpaired flow. In addition to the critical need for cold water refugia in the Klamath, other considerations in setting this high standard for a bypass flow is that the actual flows at the point of diversion may already be somewhat impaired by existing and past land use, unaccounted diversions, and changing climate. Also, streamflow measurements used to direct the diversion could have measurement errors which may result in unintentionally diverting a higher percentage of flow.

Since the POD is above the anadromous reach, an additional non-consumptive diversion for hydropower generation may occur in the reach between the POD and upper limit of anadromy provided that a minimum bypass flow is maintained in this reach to protect the low flow channel and edgewater important for macro-invertebrate production. An additional requirement is that the non-consumptive portion of the diversion is returned to Stanshaw Creek at the upper limit of anadromy and that the stream water temperature remains consistent with the stream temperature above the diversion to maintain the low temperature benefit of the cold water refugia.

There is no single flow identified as the flow that maintains connectivity of Stanshaw Creek and the Klamath River since the connection depends on site features that vary with each water year (*e.g.*, groundwater flow, water level in both the Klamath and Stanshaw Creek, and the size of the sediment berm at the confluence). Taylor (2015) estimated a Stanshaw Creek flow of 1.3 cfs when the pond was not connected to the mainstem on November 17, 2014. The lowest flow in Stanshaw Creek that ensures connectivity is probably between 2.0 and 3.0 cfs considering the annual variation in the groundwater and berm configuration. Depending on the water year type and associated timing of the spring recession period, there is a large range of the annual 7-day low flow minimum and maximum from May through October which is the beginning and end of the warm season. For the moderate water year types analyzed, the pond may become disconnected by late July or the flow may stay connected to the Klamath throughout the low flow season during a wet year. Although connection to the pond would be beneficial at all times, it is most important at flows that occur in May and June as the Klamath River temperatures begin to rise when juvenile coho salmon are seeking refuge in the cooler water. Based on the flow analysis, an unimpaired Stanshaw Creek should stay connected to the Klamath River throughout May and June in all but the driest years.

Each component of the receding hydrograph has an important biological role to provide good water quality to the Klamath River, to provide an attractive flow and access for juvenile coho salmon to Stanshaw Creek and the off channel pond before temperatures rise in the mainstem, and to maintain good water quality and food supply to the pond and Stanshaw Creek throughout the low flow period. Flows need to be conserved on wet years to provide the tributary connection, improved water quality, and cold water attractive flow into the Klamath. Flows need to be conserved on dry years to maximize the water quality and food supply to the off-channel pond and cold water seep to the Klamath. Because of the thermal sensitivity and connectivity needed throughout the summer, the Marble Mountain Ranch diversion should be limited to zero or a small fraction of the flow as the flows recede and water temperatures rise. NMFS recommends that no more than 10% of the estimated unimpaired flow be diverted from Stanshaw Creek up to the limits of anadromy, throughout the low flow season, regardless of the water year to ensure water quality and food supply is maintained for the over-summering coho salmon in the pond. By design, a 10% diversion will decrease in size as the flow decreases. For example, as the flow drops from 3 cfs to 2 cfs the allowable diversion would decrease from 0.3 cfs to 0.2 cfs. As discussed previously, diversions of 10% or less of the unimpaired flow are considered to be protective of stream ecology (Richter *et al.* 2011).

The upper reaches of Stanshaw Creek provide important macro-invertebrate production and a food source to the Klamath River, the off-channel pond, and the anadromous reach of Stanshaw Creek. The topography of five cross sections were surveyed in 2002 in the reach above the Highway 96 culvert, above the assumed upper limit of anadromy. Hydraulic analyses of the five cross sections demonstrate the changing channel width as the flows recede. Figure 5, Figure 6, and Figure 7 show an inflection in the water surface width as the flows drop between about 1.5 to 2.0 cfs for three representative cross sections (the other two cross sections are more affected by assumed boundary conditions in the hydraulic analysis). The inflection on the curve represents the point where the wetted channel width drops off relatively quickly with flow. Maintaining a flow above the inflection point is important to protect macro-invertebrate production and to provide a minimum level of edge water rearing area. Based on this analysis, a two cubic feet per second bypass flow should protect the edge water in the reach between the POD and the upper limit of anadromy. The minimum bypass of 2.0 cfs at the POD assumes a that the non-consumptive diversion of up to 3.0 cfs will be returned to Stanshaw Creek above the upper limit of anadromy. Even with 2.0 cfs minimum bypass flow, NMFS anticipates natural variation in the bypass flow at the POD as demonstrated on the example diversion shown in Figure 8.

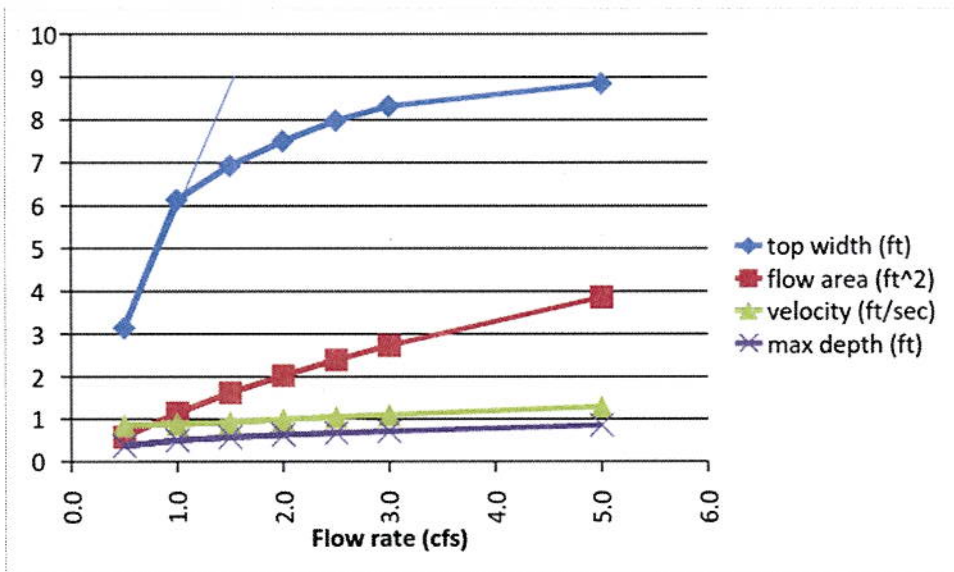


Figure 5 Cross Section 2 of Stanshaw Creek.

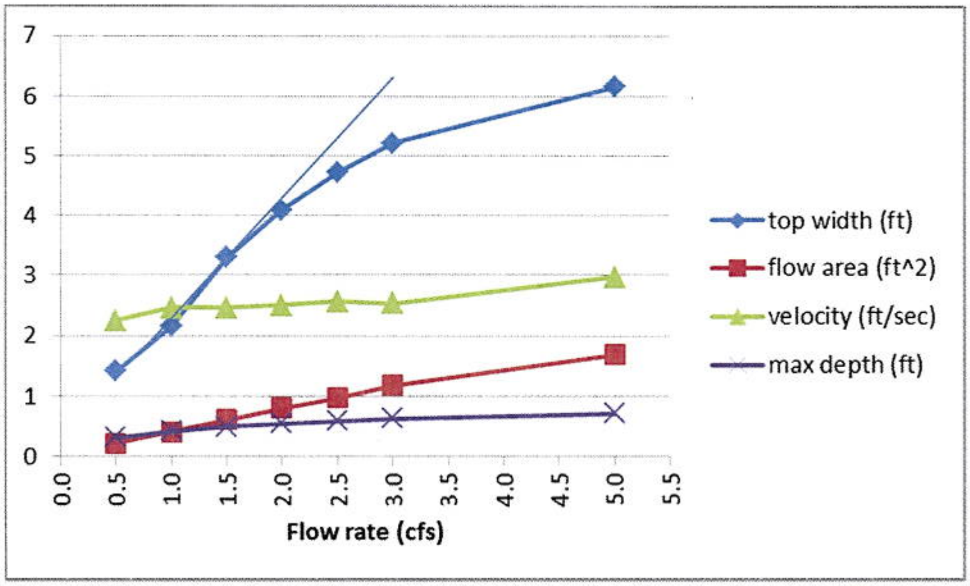


Figure 6 Cross Section 3 of Stanshaw Creek.

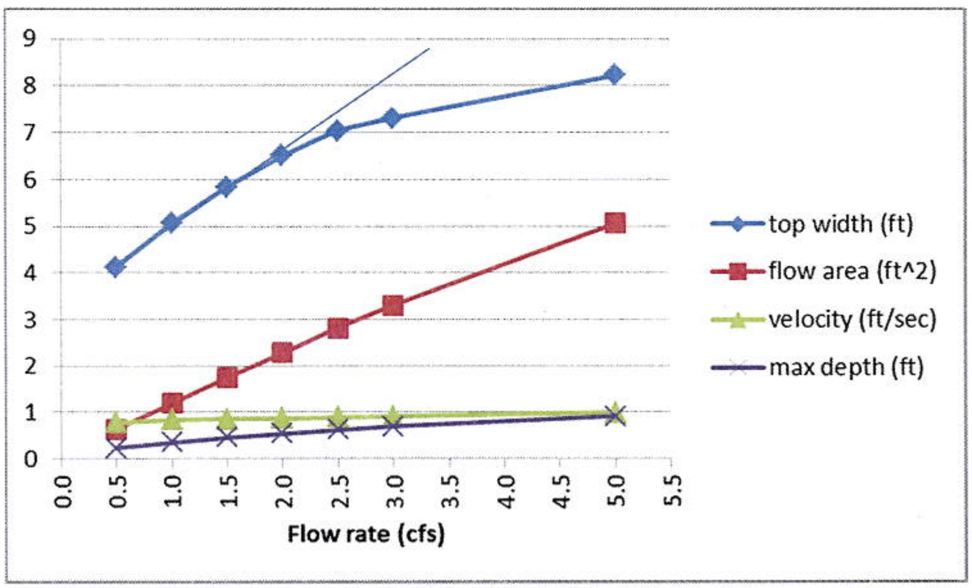


Figure 7 Cross Section 4 of Stanshaw Creek.

In summary, Stanshaw Creek low flows provide critical cold water to the Klamath River and access to cold water, off-channel refugia and food supply during low flow months. A maximum 3.3 cfs diversion that bypasses at least 90% of the unimpaired streamflow into the anadromous reach throughout the year will provide habitat to help conserve and protect listed coho salmon. In reaches above anadromy, a 2 cfs minimum bypass flow will be protective of listed salmonid habitat provided the non-consumptive diversion is returned to Stanshaw Creek with a negligible increase in water temperature. The non-consumptive (*i.e.*, hydropower) diversion is expected to only occur when streamflow is relatively high prior to the low flow season. The non-consumptive diversion is dependent on the ability to use the water and return it to Stanshaw Creek above the anadromous reach while maintaining a minimum of 2 cfs in the stream to maintain important ecosystem functions. The non-consumptive diversion used for hydropower would be limited to the minimum operating threshold of the turbine. After the threshold is reached, the non-consumptive diversion would cease, so the diversion would be limited to consumptive use and a 90% bypass would occur at the POD.

Figure 8 shows an example of the bypass flow recommendation using the Stanshaw Creek daily average stream flow estimates. The figure shows the estimated unimpaired hydrograph for the 1962 recession period and throughout the low flow season, along with the 90% bypass flow after the non-consumptive diversion is returned and the bypass at the POD with a minimum of 2 cfs. Also, shown are the diversions for consumptive and non-consumptive use. Under this bypass flow recommendation, at least 90% of the unimpaired hydrograph is preserved in the anadromous reach. This bypass flow recommendation has a daily variation as the flows naturally recede. If methods to control diversion on a real-time basis cannot be developed, further analysis could be done to establish seasonal diversions that would cover all water year type on a weekly or biweekly or monthly basis to allow manual control of the diversion.

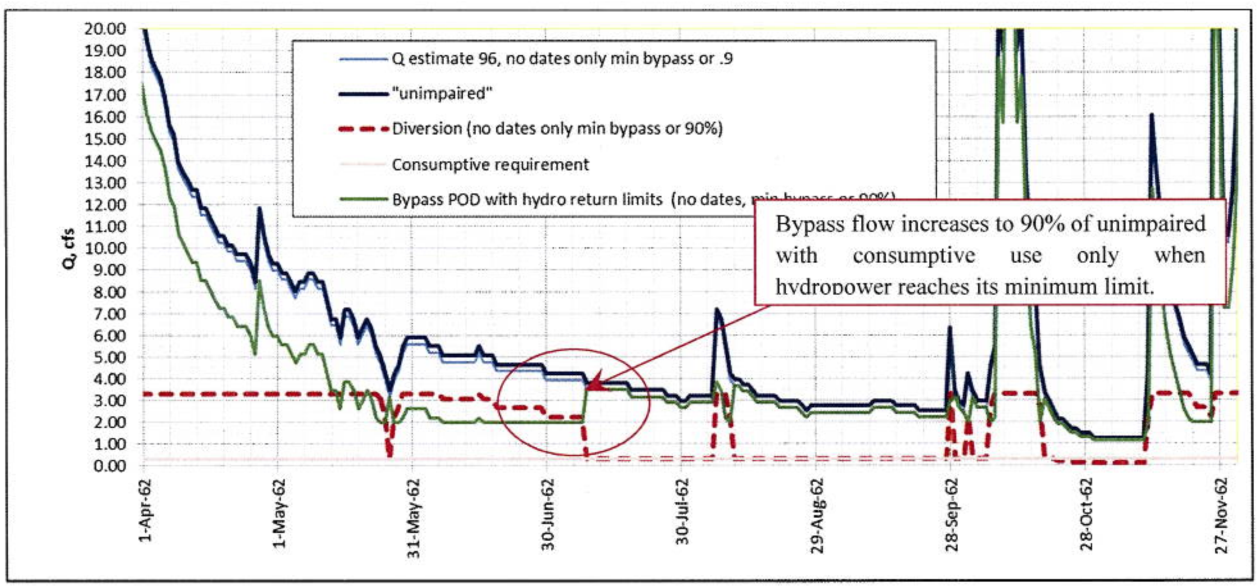


Figure 8 Example of bypass flow recommendation with assumed 0.3 cfs consumptive use and maximum 3.0 cfs non-consumptive use.

Please contact Margaret Tauzer, NMFS hydrologist/hydraulic engineer in Arcata, California at (707) 825-5174 for any additional questions concerning this flow recommendation.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

cc: Jennifer Bull, CDFW, Yreka, CA
Neil Manji, CDFW, Redding, CA

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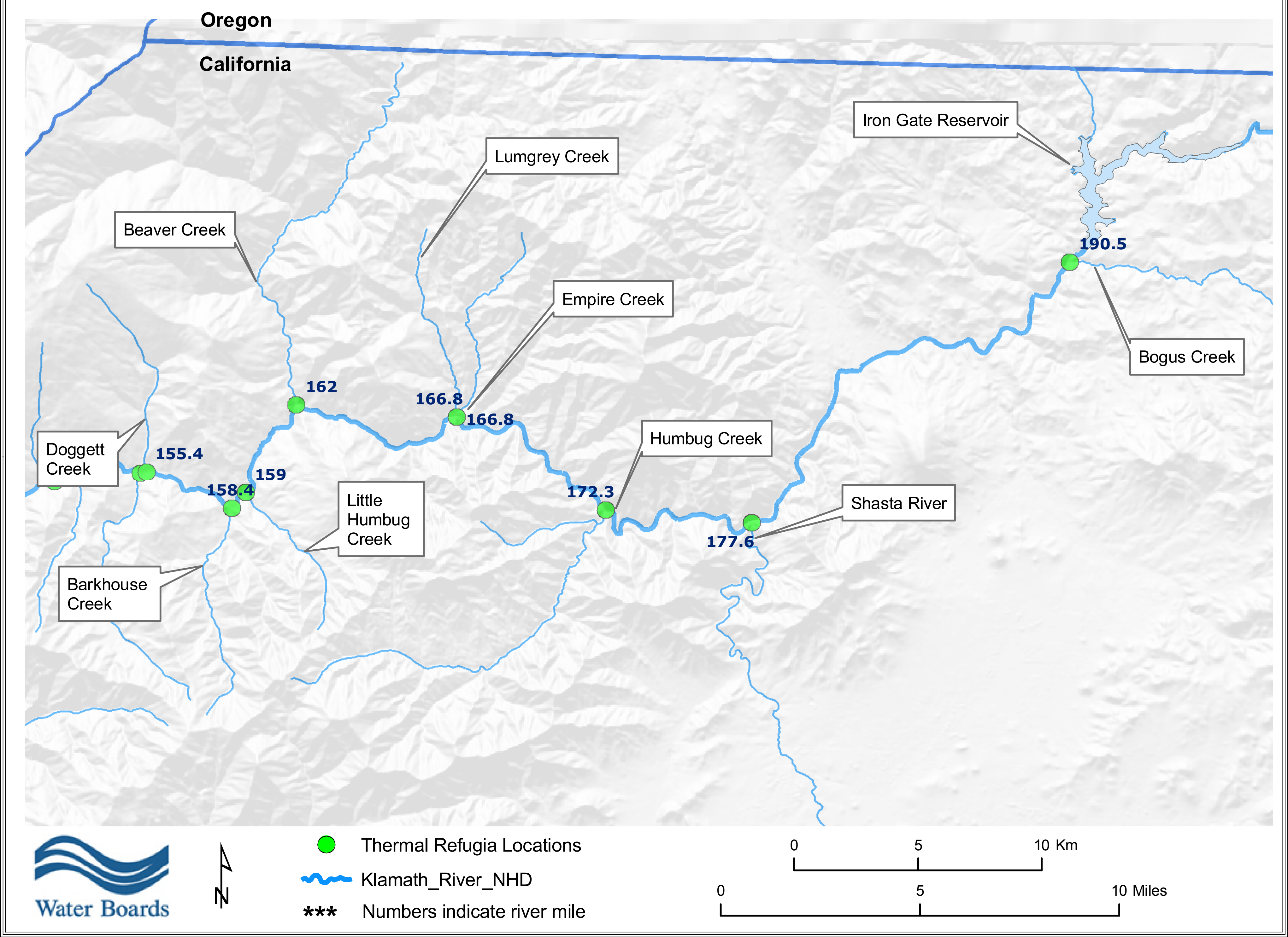
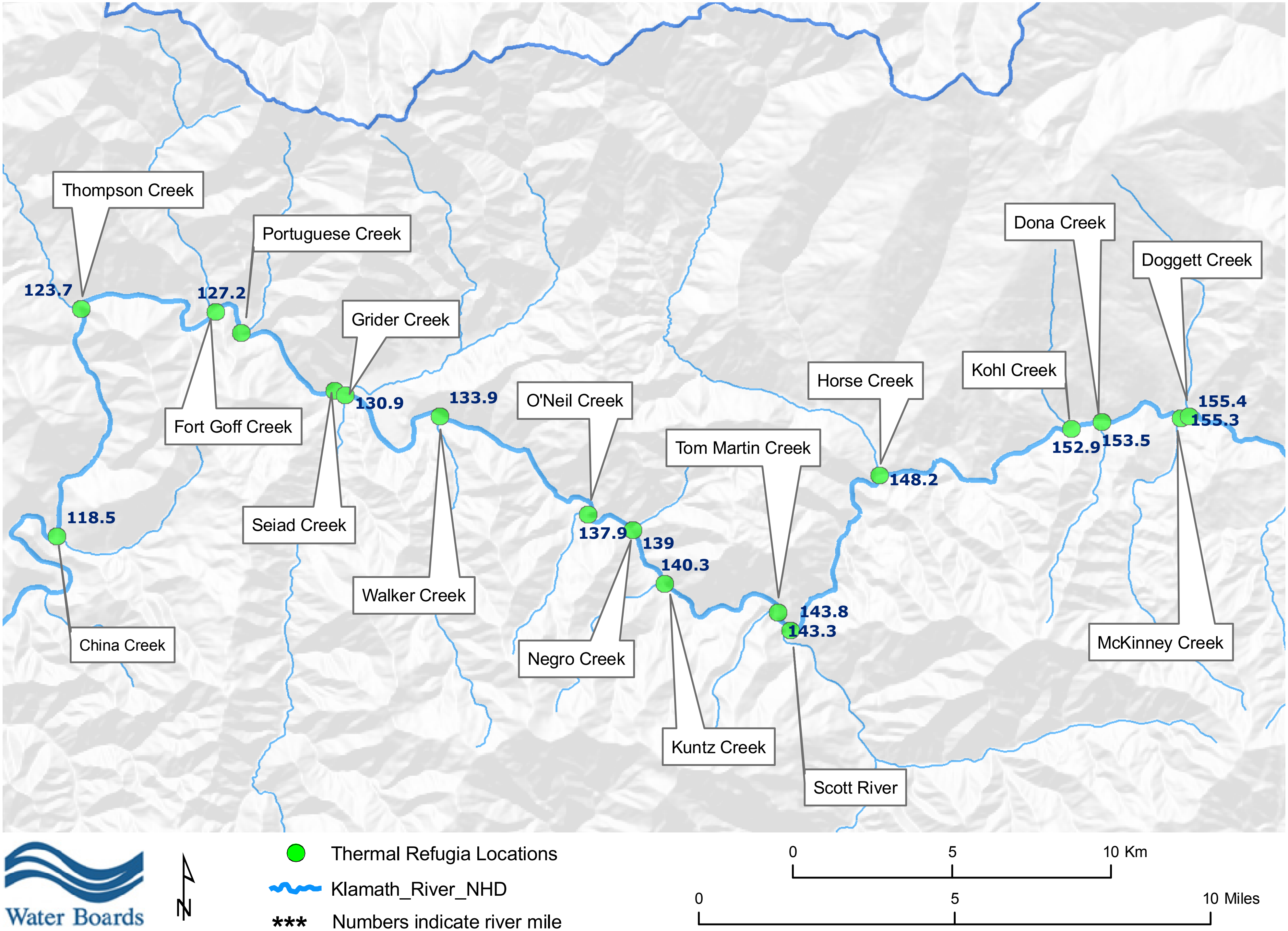
APPENDIX 9

Maps of the Klamath River Basin in California Showing the Locations of Known Thermal Refugia

North Coast
Regional Water Quality Control Board
June 2009


Oregon
California
Iron Gate Reservoir
Lumgrey Creek
Beaver Creek
Empire Creek
190.5
Bogus Creek
162
166.8
166.8
Doggett Creek
155.4
159
158.4
Humbug Creek
172.3
Shasta River
177.6
Little Humbug Creek
Barkhouse Creek
N
Thermal Refugia Locations
Klamath_River_NHD
*** Numbers indicate river mile
0 5 10 Km
0 5 10 Miles
Water Boards

WR-167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Portuguese Creek
Grider Creek
Fort Goff Creek
Seiad Creek
Walker Creek
China Creek
O'Neil Creek
Negro Creek
Tom Martin Creek
Kuntz Creek
Scott River
Horse Creek
Kohl Creek
Dona Creek
Doggett Creek
McKinney Creek
123.7
127.2
130.9
133.9
118.5
137.9
139
140.3
143.8
143.3
148.2
152.9
153.5
155.4
155.3
Water Boards
N
Thermal Refugia Locations
Klamath_River_NHD
*** Numbers indicate river mile
0
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10 Miles

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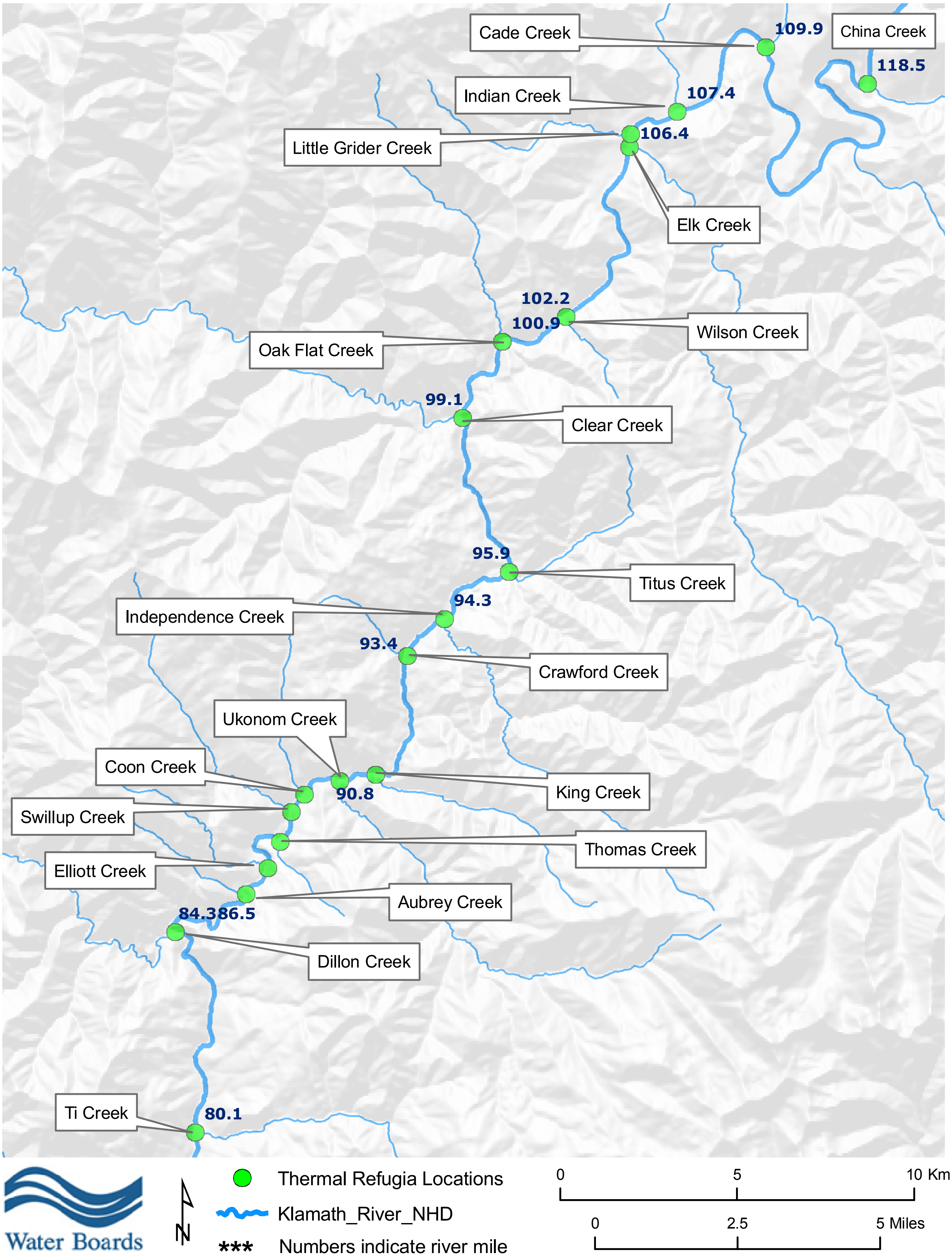
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109.9
China Creek
118.5
Indian Creek
107.4
Little Grider Creek
106.4
Elk Creek
102.2
100.9
Wilson Creek
Oak Flat Creek
99.1
Clear Creek
95.9
Titus Creek
94.3
Independence Creek
93.4
Crawford Creek
Ukonom Creek
Coon Creek
90.8
King Creek
Swillup Creek
Thomas Creek
Elliott Creek
Aubrey Creek
84.386.5
Dillon Creek
Ti Creek
80.1
Water Boards
N
Thermal Refugia Locations
Klamath_River_NHD
*** Numbers indicate river mile
0
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10 Km
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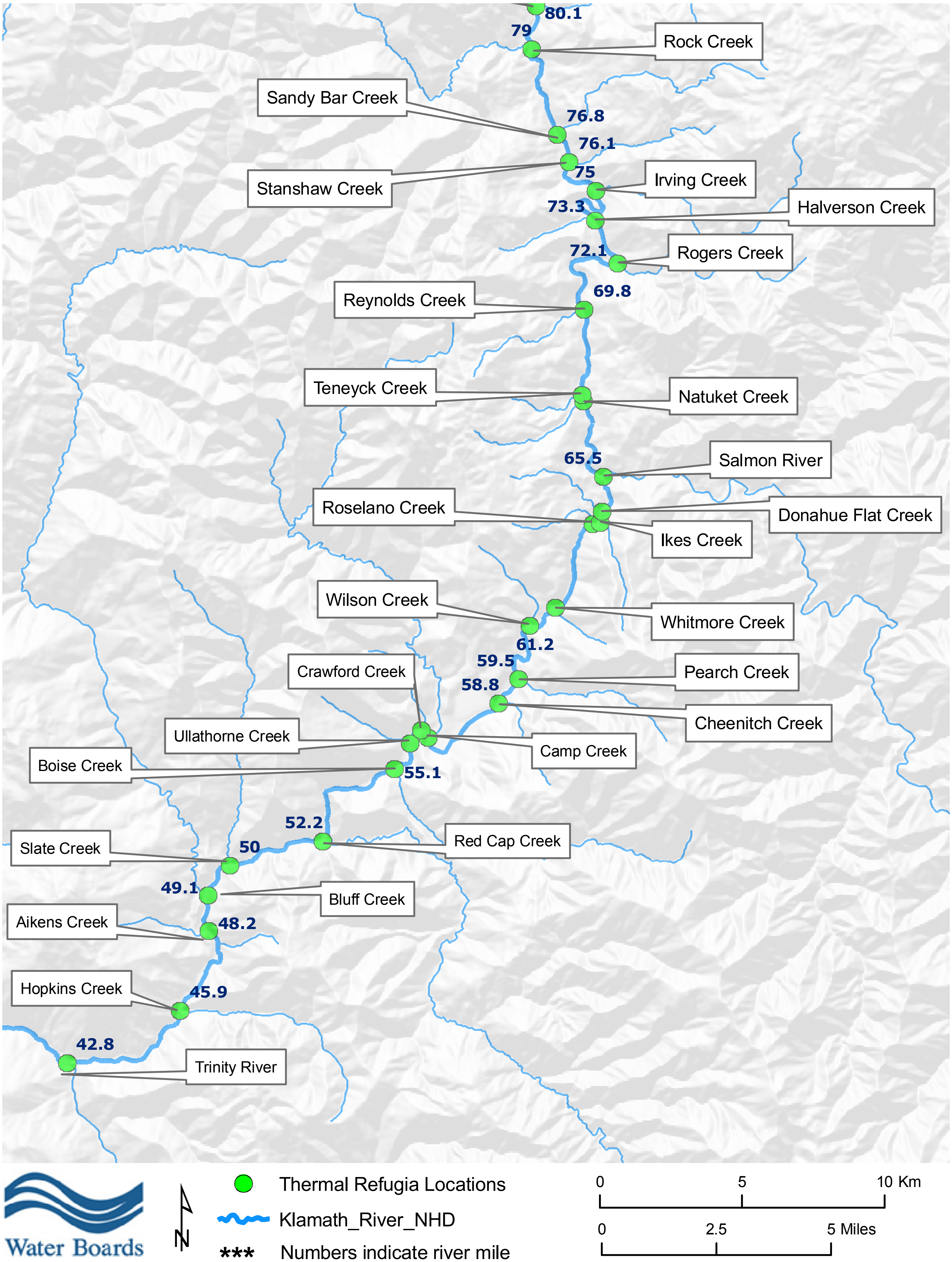
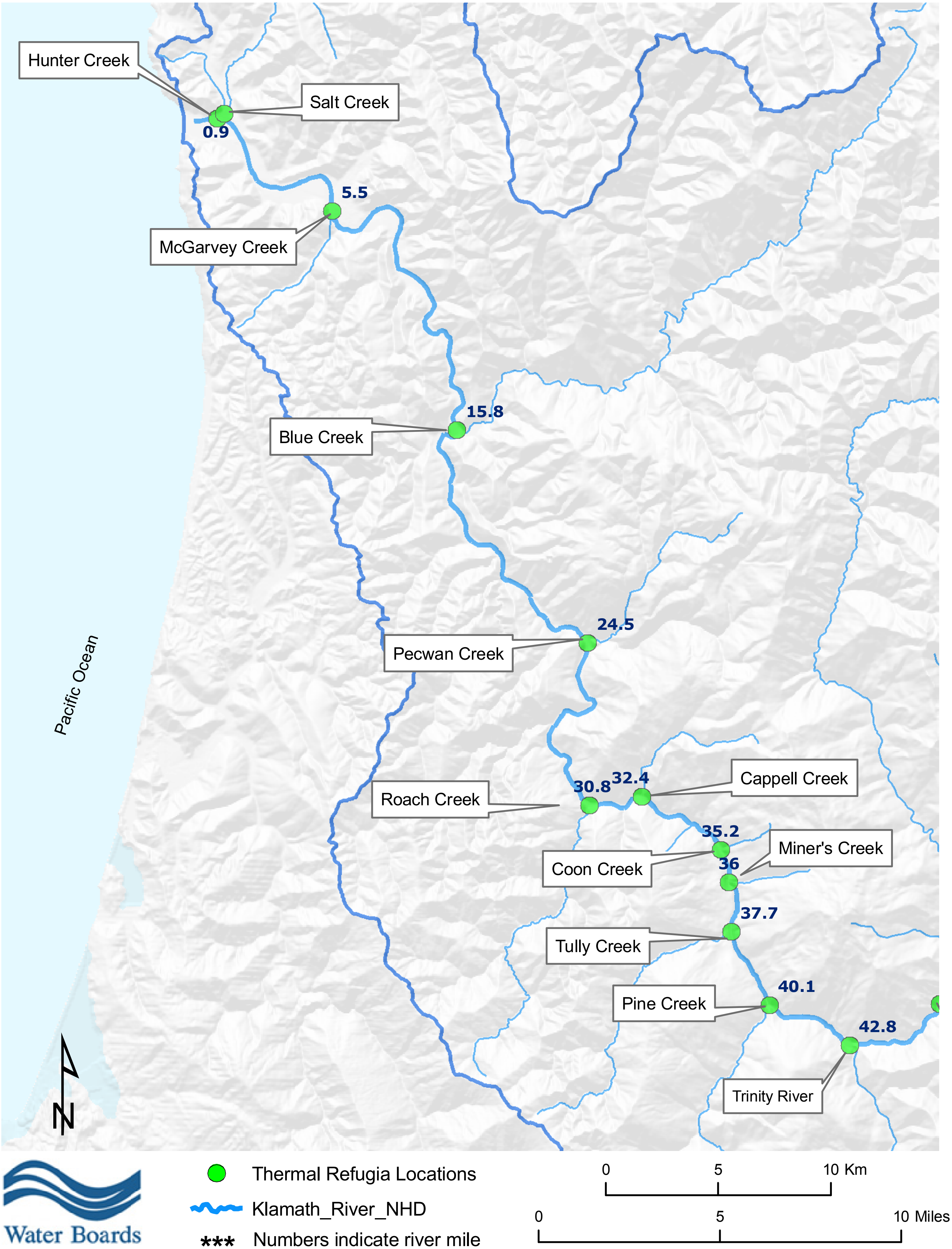

80.1
79
Rock Creek
Sandy Bar Creek
76.8
76.1
Stanshaw Creek
75
Irving Creek
73.3
Halverson Creek
72.1
Rogers Creek
Reynolds Creek
69.8
Teneyck Creek
Natuket Creek
65.5
Salmon River
Roselano Creek
Donahue Flat Creek
Ikes Creek
Wilson Creek
Whitmore Creek
61.2
59.5
Crawford Creek
Pearch Creek
58.8
Cheenitch Creek
Ullathorne Creek
Camp Creek
Boise Creek
55.1
52.2
Red Cap Creek
Slate Creek
50
49.1
Bluff Creek
Aikens Creek
48.2
Hopkins Creek
45.9
42.8
Trinity River
Water Boards
N
Thermal Refugia Locations
Klamath_River_NHD
*** Numbers indicate river mile
0
5
10 Km
0
2.5
5 Miles


Hunter Creek
Salt Creek
0.9
5.5
McGarvey Creek
15.8
Blue Creek
24.5
Pecwan Creek
Pacific Ocean
Roach Creek
30.8
32.4
Cappell Creek
35.2
Miner's Creek
Coon Creek
36
37.7
Tully Creek
40.1
Pine Creek
42.8
Trinity River
N
Water Boards
Thermal Refugia Locations
Klamath_River_NHD
*** Numbers indicate river mile
0
5
10 Km
0
5
10 Miles

Resolution No. R1-2014-0006
Attachment 2

California Regional Water Quality Control Board
North Coast Region

Resolution No. R1-2012-0013

Policy Statement

for

Implementation of the Water Quality Objective for Temperature in the North Coast Region

WHEREAS, the California Regional Water Quality Control Board, North Coast Region, (hereinafter the Regional Water Board) finds that:

Introduction

1. Elevated water temperature is a widespread water quality impairment in the North Coast Region. The purpose of this policy is to describe the range of tools available for protection against anthropogenically elevated water temperatures to remediate, restore, and protect temperature-impaired waterbodies and to control the cumulative impacts of elevated water temperature on other waterbodies. It attempts to describe in one cohesive document the Regional Water Board's efforts to date in implementing temperature objectives and guidance on the range of implementation tools for temperature protection in future programs and permits, including coordination with other state, local and federal agencies to the extent possible. It affirms the need to address water temperatures region-wide, but on a case-by-case basis in the context of a given permit or other action to reduce impairments and prevent further impairment. It directs staff to continue implementing temperature Total Maximum Daily Loads (TMDLs) through regional nonpoint source programs and individual permits, waivers, and enrollments as appropriate, and to work with other agencies to address elevated water temperatures.

2. The prevention of water quality impacts from temperature related factors has been a high priority in the North Coast Region for many years. The Regional Water Board has ranked the control of temperature impacts as a high priority under the Triennial Review process since 2001. The Triennial Review also included two other high priority issues that are relevant in the development of a region-wide temperature control program: the stream and wetlands system protection policy and instream flow objective (also referred to as the watershed hydrology objective).

Basin Plan Temperature Standards

3. The Water Quality Control Plan for the North Coast Region (hereinafter the Basin Plan) identifies the beneficial uses of waterbodies within the North Coast Region.

These uses include, but are not limited to, municipal and domestic water supply (MUN); cold freshwater habitat (COLD); warm freshwater habitat (WARM); estuarine habitat (EST); migration of aquatic organisms (MIGR); support of habitats necessary, at least in part, for the survival and successful maintenance of rare, threatened, or endangered plant or animal species (RARE); and spawning, reproduction, and early development of fish (SPWN). The Basin Plan also establishes water quality objectives, including water temperature objectives, for the protection of these beneficial uses. The beneficial uses of waterbodies, water quality objectives, and anti-degradation policies, together, constitute water quality standards.

4. The Basin Plan defines the cold freshwater habitat (COLD) beneficial use as: "*Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.*" In the North Coast Region, the iconic cold water species are salmon and steelhead. In addition, there are many other organisms, such as frogs, salamanders, aquatic insects, and resident fish species that require a cold freshwater ecosystem for survival.

5. The Basin Plan defines the intrastate water quality objective for temperature as:

   "The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses.

   At no time or place shall the temperature of any COLD water be increased by more than 5℉ above natural receiving water temperature.

   At no time or place shall the temperature of any WARM water be increased by more than 5℉ above natural receiving water temperature."

6. Natural receiving water temperatures are those that result when the factors that drive water temperatures are consistent with natural conditions. The most prominent factors are hydrology, solar radiation (the inverse of shade), air temperature, and channel geometry.

7. The Basin Plan defines the interstate water quality objective for temperature as:

   "Elevated temperature waste discharges into COLD interstate waters are prohibited," and,

   "Thermal waste discharges having a maximum temperature greater than 5℉ above natural receiving water temperature are prohibited," and,

> "*Elevated temperature wastes shall not cause the temperature of WARM interstate waters to increase by more than 5°F above natural temperature at any time or place.*"

TMDL Development

8. Section 303(d) of the Clean Water Act requires states to address impaired waters by developing a total maximum daily load (TMDL) or implementing another program that will result in the attainment of water quality standards. TMDLs establish the maximum load of a pollutant that can be assimilated without exceeding the applicable water quality standards. Temperature TMDLs include a source analysis, interpretation of water quality objectives, and load allocations that divide the allowable loading among the sources in a way that results in attainment of the water quality standards.

9. The Regional Water Board has adopted temperature TMDLs for the Salmon, Scott, Shasta, and Klamath rivers. The U.S. Environmental Protection Agency (EPA), Region IX, has established temperature TMDLs for the following waterbodies in the North Coast Region: the Eel River (six reaches), Mattole River, and Navarro River. Each of these TMDLs includes a temperature source analysis, TMDL calculation, load allocations, and a margin of safety.

10. EPA did not adopt plans of implementation for its TMDLs because it lacks implementation authority over nonpoint source pollution. EPA did include specific implementation recommendations for achieving the temperature load allocations. Those recommendations include the use of the timber harvest permitting process to protect and restore shade, implementation of the *United States Forest Service (USFS) Northwest Forest Plan* and associated standards and guidelines, and the control of sediment to achieve temperature standards.

11. Under Clean Water Act section 303(d)(2), the state must incorporate EPA TMDLs into its Water Quality Management Plan after they are approved. Clean Water Act section 303(e) requires EPA approval of a state's continuing planning process, which includes Basin Plans, regulatory programs, monitoring and quality assurance programs, nonpoint source management programs, and funding assistance programs. Similar to the *Total Maximum Daily Load Implementation Policy Statement for Sediment Impaired Receiving Waters in the North Coast Region (Sediment Policy)* discussed below (finding 26), this policy is intended to implement temperature TMDLs, including EPA temperature TMDLs in compliance with Clean Water Act section 303(d)(2).

12. Under state law, TMDLs are adopted with programs that implement correction of the impairment. The *Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options* (*Impaired Waters Policy*) is a statewide policy that describes the process for developing and adopting TMDLs. TMDLs

may be adopted in any of the following ways:

1. TMDLs and TMDL implementation strategies may be adopted with a Basin Plan amendment or another regulation or policy for water quality control that is designed to guide the Regional Water Board in correcting the impairment.

2. TMDLs and TMDL implementation strategies may be adopted with a permitting action, enforcement action, or other single regulatory action.

3. TMDLs and TMDL implementation strategies may be adopted with a resolution that certifies either that (1) a regulatory program has been adopted and is being implemented by another state, regional, local, or federal agency; or (2) a non- regulatory program is being implemented by another entity. (State Water Board Resolution No. 2005-0050, at p.8.)

If adopted under 2 or 3 above, the TMDLs must be referenced in the relevant Basin Plan before or during the next triennial review. (*Id.* at p. 9.)

13. To date, the Regional Water Board has adopted three peer-reviewed temperature TMDLs as Basin Plan amendments, each with accompanying plans of implementation, generally titled "action plans" that contain various implementation measures. All of the existing temperature TMDL action plans encourage and direct parties responsible for the management of riparian areas to implement riparian management measures that meet the riparian shade allocations and water quality standards. Temperature TMDLs developed in watersheds also impaired by sediment rely on the implementation of sediment TMDLs to achieve sediment reductions that are also necessary to achieve the temperature TMDLs.

14. In 2009, the Sierra Club, Friends of the Eel River, Friends of the Navarro Watershed, Environmental Protection Information Center, Northcoast Environmental Center and Klamath Riverkeeper filed a lawsuit alleging that the Regional Water Board violated mandatory duties under the Porter-Cologne Water Quality Control Act, Water Code section 13000 et seq., section 303(d) of the federal Clean Water Act, 33 U.S.C. section 1313(d), in failing to adopt a program of implementation for TMDLs for certain water quality-impaired waterbodies within the North Coast Region of California. Under section 303(d)(2), once EPA approves or issues a TMDL, the state must incorporate the TMDL into its water quality management plan (Basin Plans are one part of the water quality management plan). The Regional Water Board maintains that it has met all obligations for implementing TMDLs; however, it has not consolidated all of its temperature TMDL implementation efforts into a single document that could serve as an "implementation plan" for meeting the statutory requirements.

15. In February 2011, the Executive Officer entered into a settlement with petitioners

in the form of a stipulated agreement. Regional Water Board staff agreed to develop a Temperature Implementation Policy for the Regional Water Board's consideration. That rulemaking process to consider a Basin Plan amendment will follow adoption of this policy statement. As per the terms of the agreement the proposed Basin Plan amendment will be submitted to the Regional Water Board for consideration no later than December 31, 2013.

16. In 2004 the Regional Water Board adopted a Sediment Policy statement which provides for the control of sediment pollution by using existing permitting and enforcement tools. This temperature implementation policy statement is similar but broader in describing an approach that, where possible and if appropriate and necessary, encourages the combination of TMDL requirements with region-wide nonpoint source programs for efficiency and to avoid duplicative regulation.

17. Temperature TMDL analyses completed to date have consistently found the same factors to be responsible for elevated water temperatures: increased exposure to solar radiation due to loss of stream shade, physical stream channel alteration in response to elevated sediment loads, and in some cases agricultural tail water, impoundments, and water diversions.

18. Temperature impairments are predominantly associated with nonpoint source pollution, which is generally defined as pollution that is not a "point source discharge" requiring a National Pollution Discharge Elimination System (NPDES) permit under the federal Clean Water Act.[1] Under the state Porter-Cologne Water Quality Act, nonpoint source discharges of waste are regulated under waste discharge requirements (WDRs), waivers of WDRs, prohibitions, or a combination thereof. Temperature is also addressed in water quality certifications issued pursuant to section 401 of the Clean Water Act. As explained in more detail below, the Regional Water Board has been implementing temperature controls in its region-wide nonpoint source pollution programs and in individual permits on a case-by-case basis, often in the context of sediment discharges. Elevated temperature is also caused by factors outside the core regulatory programs of the Regional Water Board that may be addressed by other public agencies, for example water diversions under the jurisdiction of the State Water Resources Control Board (State Water Board),

[1] The discharge of waste associated with storm water drainage system-related point sources has the potential to increase water temperature in a receiving waterbody. However, storm water discharges predominantly occur during periods of rainfall, when water temperatures generally support beneficial uses. Discharges not associated with rainfall events (non-storm water discharges) are sometimes discharged through storm water conveyance systems, thus the possibility of water temperature impacts associated with storm water systems must be considered. The discharge of waste associated with other point sources also has the potential to increase water temperatures in the receiving waterbody. However, point source discharges are generally not permitted in any North Coast watersheds except the Russian and Eel river watersheds, where winter time discharges are permitted at high dilution ratios. These discharges, as permitted, do not exceed the water quality objective for temperature.

Division of Water Rights.

19. Implementation of temperature protection measures in the context of region-wide nonpoint source programs, particularly riparian management, is discussed in more detail below, followed by a discussion of implementation options for sources not within the Regional Water Board's core regulatory jurisdiction.

Riparian Management

20. The removal of vegetation that provides shade to a waterbody is a controllable water quality factor.

21. Temperature TMDL load allocations for solar radiation in North Coast TMDL analyses are expressed in terms of site-potential effective shade. Site-potential effective shade is equal to the shade provided by topography and full potential vegetation conditions at a site, with an allowance for natural disturbances such as floods, wind throw, disease, landslides, and fire. The Regional Water Board has discretion on how to implement load allocations on a case-by-case basis. This policy is not intended to predetermine precise parameters for effective shade for a specific location or land use.

22. Compliance with the temperature TMDL load allocations for solar radiation is generally achieved by not removing or hindering vegetation that provides shade to a waterbody. To accomplish this, responsible parties are encouraged to delineate a separate management area for riparian vegetation that has the potential to shade a waterbody, and manage these riparian areas differently than the surrounding land. These areas are often referred to variously as a riparian management zone, streamside buffer area, or a watercourse and lake protection zone.

23. Shade controls effective at correcting temperature impairments also operate to prevent impairments, as well as provide other water quality protections. Riparian management may also impact waterbodies not currently listed as impaired for temperature.

24. The establishment of riparian buffers for temperature protection is an effective and important management measure for the control of some types of sediment discharges. Maintenance of a vegetated buffer provides a control on the discharge of sediment mobilized by surface erosion. Also, the retention of mature trees (and their roots) along a stream bank provides bank stability, reducing the discharge of sediment associated with stream bank landslides and debris flows. Maintenance of a vegetated buffer along streams also can ensure a supply of large woody debris to the stream channel, which is critical for metering of sediment, channel forming processes, and fish habitat.

Incorporating Riparian Management and Other Temperature Controls into Region- Wide Permitting

25. Completed sediment and temperature TMDLs identify and assign load allocations to similar categories of land uses that generate nonpoint source discharges of waste and pollution, such as timber harvest, roads, agriculture, and grazing. Implementation actions taken to achieve load allocations should be consistent with the Porter-Cologne Water Quality Control Act, as described in the *Statewide Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program*, which requires nonpoint sources be regulated under WDRs, waivers of WDRs, a Basin Plan prohibition, or some combination of these tools.

26. Often, the same management measures can address nonpoint source water quality concerns regardless of whether or not the waterbody is impaired. In addition, often several pollutants can be addressed by the same management measure, particularly sediment and temperature, and sometimes nutrients. In the past, the Regional Water Board has included conditions that ensure compliance with TMDL load allocations and the intrastate water quality objective for temperature under one permitting structure (i.e. waiver or WDR) where possible. Incorporating TMDL implementation into a broad-based nonpoint source approach increases efficiency and avoids overlapping water quality regulation.

27. Certain nonpoint source activities may be subject to regulatory or nonregulatory actions of other entities that provide temperature protections. If the Regional Water Board determines that those actions will result in attainment of water quality standards, the Regional Water Board may include those actions as implementation measures in a permit. The Regional Water Board can, and often does, rely on existing non-Water Board programs for permit measures, adding new requirements only as necessary to provide adequate water quality protection. (See e.g. finding 32 [discussion of the USFS Waiver].)[2] When addressing compliance with the temperature objective, the geographic location, existing regulatory and nonregulatory programs, and other relevant factors should be evaluated in determining appropriate and necessary shade controls.

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[2] In some cases, an aquatic Habitat Conservation Plan (HCP) contains requirements that meet or are even more protective than necessary to meet the temperature objectives. An example of this is the Green Diamond Aquatic HCP, which includes retention and recruitment measures that exceed the Anadromous Salmonid Protection (ASP) rules in density and geographic location. The HCP riparian management standards call for high levels of canopy retention within 150 feet of fish-bearing streams and 100 feet on all other streams supporting aquatic life. These measures are being considered and are expected to be relied upon for TMDL and temperature objective compliance in the development of property-wide WDRs.

This policy in no way limits the State Water Board or Regional Water Board's authority and discretion to develop riparian management measures as appropriate for a specific land use or geographic area.

28. In 2004, the Regional Water Board adopted Resolution R1-2004-0087, the *Sediment Policy*, which directs staff to use existing authorities to strengthen regulatory controls of nonpoint source discharges of sediment. Implementation of that *Sediment Policy* also partially implements the intrastate water quality objective for temperature insofar as the control of sediment discharges partially addresses elevated water temperatures. Sediment conditions interact with water in many ways that can affect water temperatures. Therefore, practices implemented to prevent and minimize elevated sediment discharges can also help control elevated water temperatures. This policy directs staff to implement the *Sediment Policy* as a means of addressing elevated water temperature associated with excess sediment discharges.

29. The Regional Water Board has made the most progress to date in implementing comprehensive nonpoint source permit coverage for timber harvest activities. Timber harvest activities have the potential to impact water temperature, depending on how the activities are conducted. For timber harvest activities on private lands, the Regional Water Board incorporates the California Board of Forestry's *Forest Practice Rules* into water quality permits for ease of reference, for consistent terminology, and to avoid duplicative processes to the degree possible. The California Department of Forestry and Fire Protection (CAL FIRE), as the lead agency in approving timber harvest activities on private lands, convenes a multi-agency team that includes CAL FIRE, the California Department of Fish and Game, the California Regional Water Quality Control Boards, the California Geological Survey, and other agencies as needed, to conduct a review of a timber harvest plan (THP). Each agency may recommend incorporating mitigating measures into the THP to reduce adverse impacts of the operation on timberland resources, including the beneficial uses of water. Through this process, Regional Water Board staff have an opportunity to make specific THP recommendations and clarify Basin Plan requirements, if needed, so that the final THP is eligible for enrollment in the timber GWDRs or waivers. Under the *Forest Practice Rules*, timber operations within designated watercourse and lake protection zones must adhere to canopy retention standards to address stream temperature issues, sediment and nutrient loading, and recruitment of large woody debris. Recent modifications to the *Forest Practice Rules* to address anadromous fish habitat (Anadromous Salmonid Protection rules) have resulted in canopy retention standards that are generally protective of shade and water temperatures in the areas where they apply. Compliance with the intrastate water quality objective for temperature may in some instances require additional canopy protections, particularly in areas outside the range of anadromy.

30. In 2004, the Regional Water Board adopted Order R1-2004-0030: *General Waste*

Discharge Requirements for Discharges Related to Timber Harvest Activities on Non-Federal Lands in the North Coast Region (Timber GWDRs). The *Timber GWDRs* contain a provision that all water quality requirements must be met to qualify for enrollment in the *Timber GWDRs*. As defined, water quality requirements include water quality objectives (narrative or numeric), prohibitions, TMDL implementation plans, policies, or other requirements contained in a water quality control plan adopted by the Regional Water Board and approved by the State Water Board, and all other applicable plans or policies adopted by the Regional Water Board or State Water Board, including, but not limited to, the State Water Board Resolution No. 68-16: *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Because TMDL load allocations are established as necessary conditions for achievement of water quality standards (i.e., water quality objectives in the context of beneficial uses), applicable load allocations should be incorporated into a THP to qualify for enrollment in the *Timber GWDRs*. This policy directs staff to continue implementing temperature load allocations through *Timber GWDRs* enrollments in areas subject to existing temperature TMDLs, including EPA-established temperature TMDLs. Staff should implement similar shade controls through *Timber GWDRs* enrollments in areas listed as impaired for temperature, as appropriate. Shade controls for *Timber GWDRs* enrollments region-wide, as appropriate and necessary, will prevent future impairments and ensure compliance with the intrastate water quality objective for temperature.

31. In 2009, the Regional Water Board adopted Order R1-2009-0038: *Categorical Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities On Non-Federal Lands in the North Coast Region (Non-Federal Timber Waiver).* The *Non-Federal Timber Waiver* includes conditions that implement TMDL load allocations and meet the Basin Plan intrastate temperature objective by requiring the protection of shade producing canopy. This policy directs staff to continue implementing the *Non-Federal Timber Waiver* as a mechanism for compliance with temperature TMDLs, including EPA-established TMDLs, and the intrastate water quality temperature objective.

32. In 2010, the Regional Water Board issued Order R1-2010-0029: *Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region* (*USFS Waiver*), a conditional waiver addressing certain nonpoint source activities on United States Forest Service lands in the region, including timber, roads, and grazing. This permit, by virtue of its conditions, also implements sediment, temperature, and nutrient TMDLs, and meets the Basin Plan intrastate temperature objective. Implementation of the *USFS Waiver* and the temperature TMDL action plans meets temperature TMDL load allocations and achieves compliance with the water quality objective for temperature in over half of the North Coast Region. The *USFS Waiver* includes adequate temperature controls for livestock grazing. The *USFS Waiver* adopts the USFS program that manages and maintains designated riparian zones to ensure retention of adequate

vegetative cover that results in natural shade conditions. The USFS program requires retention of trees within 300 feet slope distance on each side of fish-bearing streams, 150 feet slope distance on each side of perennial streams, and 100 feet slope distance on each side of ephemeral / intermittent streams, or the site potential tree height distance on each side of the stream, whichever is greatest. The *USFS Waiver* provides for exceptions to these requirements if it can be demonstrated that the exception will result in a net long-term benefit to water quality and stream temperatures. This policy directs staff to continue implementing the *USFS Waiver* as a mechanism for compliance with temperature TMDLs, including EPA-established TMDLs, and the intrastate water quality temperature objective.

33. Staff should examine and address temperature when developing other permits for nonpoint source activities. Regional Water Board staff are actively developing region-wide permits for dairies, county road maintenance, and irrigated lands, and shade control is expected to be a component in each of these programs. At a minimum, any program or permit should implement temperature shade load allocations in areas subject to existing temperature TMDLs, including EPA-established temperature TMDLs. Any program or permit should implement riparian management measures in areas listed as impaired for temperature, and region- wide as appropriate and necessary to prevent future impairments and to comply with the intrastate temperature objective.

34. The use of riparian areas by livestock can lead to impacts that elevate water temperatures. However, the use of riparian areas by livestock can be conducted without these temperature impacts. The intensity, duration, and timing of livestock use are critical considerations that determine whether livestock use is or is not harmful to riparian areas. For non-USFS land, Regional Water Board staff is currently participating in a collaborative effort involving the State Water Board and multiple regions to develop a grazing regulatory program to address water quality impacts associated with livestock grazing in impaired waters. Given the potential for livestock use of riparian areas to elevate water temperatures, it is important that any program associated with grazing address factors that elevate water temperatures. This policy directs staff to participate in the grazing regulatory program development process to consider and address factors that elevate water temperatures or impact existing cold water resources.

35. The excess water diverted for flood irrigation and returned to streams (irrigation tailwater discharge) can elevate the temperature of the receiving stream. Depending on various factors, including time of year and day, the temperature of the irrigation tailwater discharge can be substantially higher than the receiving water temperature, thus elevating the temperature of the receiving water. Regional Water Board staff are currently developing an irrigated lands water quality program. Elevated water temperatures associated with irrigation tailwater discharges should be considered and addressed through the irrigated lands water quality program and watershed-

specific waivers.

Individual and Site-Specific Permitting

36. In addition to considering and addressing temperature impacts in the development of any nonpoint source region-wide programs, the Regional Water Board should continue to employ a range of available regulatory, executive, and enforcement tools to address elevated temperatures on a case-by case basis, as appropriate. These tools include, but are not limited to, investigative orders under Water Code section 13267; cleanup and abatement orders under Water Code section 13304; waste discharge requirements under Water Code section 13263; water quality certifications pursuant to section 401 of the Clean Water Act; time schedule orders under Water Code section 13300; cease and desist orders under Water Code sections 13301-303; administrative civil liabilities under Water Code section 13350 and 13375, and the grants and loans program. This policy directs staff to use all available regulatory, executive, and enforcement tools, as appropriate, to address elevated water temperatures, and preserve existing cold water resources.

37. The alteration of stream bed, banks, and floodplains has potential to elevate water temperatures. Such projects may involve removal of vegetation and/or channel alteration, and have potential to increase sediment loads. The Regional Water Board regulates these activities through the 401 water quality certification process or WDR program. This policy directs staff to address factors that contribute to elevated water temperatures when issuing 401 certifications or WDRs for projects that alter the bed, banks, and floodplains of waters of the state. At a minimum, any 401 certification or WDR should implement temperature shade load allocations in areas subject to existing temperature TMDLs, including EPA-established temperature TMDLs. If applicable, any 401 certification, WDR, or order should implement similar shade controls in areas listed as impaired for temperature, and region-wide as necessary and appropriate to prevent future impairments and to comply with the intrastate temperature objective.

38. Restoration is an important tool for achieving water quality conditions sufficient to protect and restore beneficial uses, and may be particularly necessary to address some temperature impairments. Watershed studies conducted to assess water quality and identify appropriate corrective measures in impaired watersheds have found restoration to be a critical component of any water quality attainment program. Staff should consider temperature benefits of restoration projects when reviewing and recommending grant and loan applications, and where appropriate, support implementation of restoration projects aimed to correct temperature impairments.

Other Agencies with Oversight of Activities Affecting Temperature

39. In some cases, activities contribute to temperature impairments but are outside the jurisdictional authority of the Regional Water Board. The Regional Water Board works with many agencies with jurisdiction or authority to address water quality issues.

40. The diversion and storage of water has the potential to elevate water temperatures. The State Water Board's Division of Water Rights (Division of Water Rights) issues water right permits for the diversion of surface waters and Regional Water Board staff often work with Division of Water Rights staff to ensure Basin Plan requirements are reflected in water right permits and other water right orders. The *Policy for Maintaining Instream Flows in Northern California Coastal Streams* (May 4, 2010) specifically calls for involvement by Regional Water Boards to help ensure adequate consideration of water quality concerns. The Division of Water Rights also issues 401 water quality certifications for projects requiring a Federal Energy Regulatory Commission (FERC) license. Regional Water Board staff provide recommendations and identify water quality conditions that are necessary to ensure that the activity will comply with water quality standards. This policy directs Regional Water Board staff to continue to work with the Division of Water Rights to ensure that temperature and other water quality concerns are identified and addressed in the water right permitting process in all waterbodies.

41. Regional Water Board staff often submit water quality comments to cities and counties during the development of their ordinances and general plans. State guidelines require that local general plans should incorporate water quality policies from Basin Plans to the extent they are relevant. The planning and land use authorities entrusted to cities and counties include the authority to limit impacts from land uses to waters of the state and other natural resources. This policy directs staff to continue to provide cities and counties guidance and recommendations on compliance with the Basin Plan, and specifically the intrastate water quality objective for temperature.

42. Programs and activities implemented by other state and federal agencies often address or have the potential to affect conditions that influence water temperatures. The Regional Water Board routinely reviews financial and technical assistance programs, development activities, environmental impact statements, rule making, and monitoring programs developed and/or administered by agencies, such as the US Department of Agriculture, Natural Resource Conservation Service, US Army Corps of Engineers, US Bureau of Reclamation, USFS, FERC, Department of Defense, National Park Service, CAL FIRE, California Department of Fish and Game, and Bureau of Land Management. This policy directs staff to continue to provide state and federal agencies guidance and recommendations on compliance with the Basin Plan, and

specifically the intrastate water quality objective for temperature.

43. The Regional Water Board often supports and coordinates with the Natural Resource Conservation Service, Resource Conservation Districts, and the University of California Cooperative Extension on landowner outreach and agricultural nonpoint source reduction efforts, and relies on their landowner assistance programs for implementation of appropriate nonpoint source management practices on private lands. This policy directs staff to continue to work with the Natural Resource Conservation Service, Resource Conservation Districts, and the University of California Cooperative Extension to provide landowners guidance on compliance with the intrastate water quality objective for temperature, and assistance with implementation of actions that support water quality.

Monitoring

44. Monitoring is an important element of any regulatory program. Implementation and effectiveness monitoring are often incorporated into permits and grant agreements and reported through those processes. This policy directs staff to:
    - incorporate monitoring into permits and grant agreements as necessary and appropriate in order to confirm that management actions required to prevent or reduce elevated temperatures are implemented and effective; and
    - develop and implement a region-wide water temperature trend monitoring program to determine the long-term effectiveness of the *Temperature Policy*.

Other Findings

45. This policy is consistent with the provisions of the State Water Resources Control Board Resolution No. 68-16: the *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Resolution No. 68-16 incorporates the federal Anti-degradation Policy.

46. This policy does not constitute a discretionary permit or regulation or other discretionary action constituting a "project" as that term is defined by the California Environmental Quality Act (CEQA). (14 Cal. Code Regs., tit. 14,§15378.) Thus, no environmental review is required under CEQA. Moreover, if this policy were construed as a project triggering CEQA review obligations, consistent with the CEQA Guidelines' Class 7 and Class 8 Exemptions, this policy is an action taken by a regulatory agency to "assure the maintenance, restoration, or enhancement of a natural resource where the regulatory process involves procedures for protection of the environment." (14 Cal. Code Regs., tit. 14, §§15307 & 15308.)

THEREFORE, BE IT RESOLVED THAT:

1. A Temperature Implementation Policy shall be incorporated into the Basin Plan as soon as possible. The proposed Basin Plan amendment shall be submitted to the Regional Water Board for consideration no later than December 31, 2013.

2. The Regional Water Board has authority to implement temperature TMDLs through a combination of riparian management and other temperature controls as appropriate in nonpoint source control programs; individual permitting, grants and loans, and enforcement actions; support of restoration projects; and coordination with other agencies with jurisdiction over controllable factors that influence water temperature.

3. This policy in no way limits the State Water Board or Regional Water Board's authority and discretion to develop riparian management measures as appropriate and necessary for a specific land use or geographic area, and in consideration of existing regulatory and non-regulatory programs in place that provide temperature protections.

4. Staff should continue to implement the *Sediment Policy* as a means of addressing elevated water temperature associated with excess sediment discharges.

5. Staff should continue implementing the *Non-Federal Timber Waiver* and *USFS Waiver* as a mechanism for compliance with temperature TMDLs, including EPA- established TMDLs, and the intrastate water quality temperature objective.

6. Staff should continue to implement shade load allocations through *Timber WDR* enrollments in areas subject to existing temperature TMDLs, including EPA-established temperature TMDLs, based on existing legal authority. Staff should implement similar shade controls through *Timber WDR* enrollments in areas listed as impaired for temperature but lacking a TMDL, and region-wide as appropriate and necessary to prevent future impairments and to comply with the intrastate temperature objective.

7. Staff should examine and address temperature impacts when developing permits or programs for nonpoint source activities, including those for dairies, county road maintenance and construction, and irrigated agriculture. Staff should consider all available measures to prevent and control the elevation of water temperatures such as sediment best management practices and cleanups, riparian management including shade, and mitigation of tailwater and impoundments, as appropriate, in permit or program development. It is the intent of the Regional Water Board to address elevated water temperatures associated with irrigation tailwater discharges through existing TMDL action plans and a future region-wide irrigated lands water quality program.

8. Staff should participate in the State Water Board's statewide grazing program development process to ensure that factors that elevate water temperatures or preserve existing cold water resources are considered and addressed. Additionally, staff should address the water temperature impacts associated with livestock use in waivers of WDRs, as appropriate and necessary.

9. Staff should address factors that contribute to elevated water temperatures when issuing 401 certifications or WDRs (permits) for individual projects. Any permit should be consistent with the assumptions and requirements of temperature shade load allocations in areas subject to existing temperature TMDLs, including EPA- established temperature TMDLs, as appropriate. If applicable, any permit or order should implement similar shade controls in areas listed as impaired for temperature but lacking a TMDL and region-wide as appropriate and necessary to prevent future impairments and to comply with the intrastate temperature objective.

10. Staff should use other regulatory, executive, and enforcement tools, as appropriate, to address elevated water temperatures and preserve existing cold water resources.

11. The Regional Water Board supports and encourages restoration projects that are designed to eliminate, reduce, or mitigate existing sources of temperature impairments. Staff should continue to administer, encourage, and support the use of grant funds to facilitate projects that address elevated water temperature concerns. Staff should pursue non-regulatory actions with organizations, landowners, and individuals to encourage the control of elevated water temperatures, watershed restoration, and protection activities.

12. Staff shall continue to coordinate with the State Water Board's Division of Water Rights by participating in the water right application and petition process, providing monitoring recommendations, joint compliance inspections, submittal of data in support of 401 certifications related to water diversions and/or facilities regulated by the FERC, participation in instream flow studies, and any other appropriate means to help ensure that the terms of water right permits and licenses are consistent with the intrastate water quality objective for temperature.

13. Staff should continue to provide guidance and recommendations to cities and counties on compliance with the water quality objectives for temperature and work with local governments to develop strategies to address the prevention, reduction, and mitigation of elevated water temperatures, including, but not limited to, riparian ordinances, general plans, and other management policies.

14. Staff should continue to provide local, state, and federal agencies, landowners, and the public guidance and recommendations on compliance with the Basin Plan, and specifically the intrastate water quality objective for temperature.

15. Staff should continue to participate in the development of the stream and wetland system protection policy to ensure that policy and the policy direction provided herein are consistent and support each other, and in coordination with other state, local and federal policies and programs.

16. Where appropriate, staff should propose monitoring requirements for incorporation into permits, programs, and other orders to confirm that management actions required to prevent or reduce elevated temperatures are implemented and effective.

17. Staff should develop and implement a region-wide water temperature trend monitoring program to assist the Regional Water Board in determining whether this policy is effectively reducing and preventing elevated temperatures over the long-term.

CERTIFICATION

I, Catherine Kuhlman, Executive Officer do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, North Coast Region, on January 19, 2012.

Original Signed by

Catherine Kuhlman
Executive Officer

Resolution No. R1-2014-0006
Attachment 1

[Add a new sub-section to the Water Quality Control Plan for the North Coast Region implementation chapter (Chapter 4) with the following policy. This section will be added after the "Region-wide Policies Affecting TMDLs, A. Sediment TMDL Implementation Policy". In addition to adding the following language, several editorial revisions will be made, including appropriate changes to the Title Page, Table of Contents, Summary of Basin Plan Amendments (Appendix 1), page numbers, table and figure numbers, footnote numbers, and headers and footers to reflect the new language. The final locations of tables and figures in relation to the text may also be changed to accommodate the existing formatting of the Basin Plan.]

B. POLICY FOR THE IMPLEMENTATION OF THE WATER QUALITY OBJECTIVES FOR TEMPERATURE

The strategy for implementing the intrastate and interstate water quality objectives for temperature in the North Coast Region is set forth in the *Policy Statement for Implementation of the Water Quality Objective for Temperature in the North Coast Region*.[1] The Regional Water Board shall address sources of elevated water temperature region-wide but on a case-by-case basis in the context of a given permit or other action as appropriate and necessary to reduce impairments and prevent further impairment.

The water quality objectives for temperature shall be implemented through a combination of riparian management and other temperature controls as appropriate in nonpoint source control programs; permits and waivers, grants and loans, and enforcement actions; support of restoration projects; and coordination with other agencies with jurisdiction over controllable factors that influence water temperature.[2] Controllable water quality factors affecting water temperature include, but are not limited to, any anthropogenic activity which results in the removal of riparian vegetation that provides shade to a waterbody, sediment discharges, impoundments and other channel alterations, the reduction of instream summer flows, and the reduction of cold water sources.

To attain and maintain the water quality objectives for temperature, the Regional Water Board and its staff will implement programs and collaborate with others in such a manner as to prevent, minimize, and mitigate temperature alterations associated with the following factors:

1. Activities with the potential to reduce riparian shading of waterbodies;
2. Activities with the potential to increase sediment delivery;
3. The quality, quantity, location and timing of effluent, storm water, and agricultural return flow discharges;
4. The location, size, and operation of in-channel impoundments with the ability to alter the natural temperature regime;
5. Actions with the potential to change stream channel geometry;
6. Activities with the potential to reduce instream flows or reduce sources of cold water, including cold water refugia.

This policy in no way limits the State Water Board or Regional Water Board's authority and discretion to develop riparian management measures and other measures as appropriate and necessary for a specific land use, activity, or geographic area, and in consideration of existing regulatory and non-regulatory programs in place that provide temperature protections.

The Regional Water Board shall take the following actions to achieve temperature objectives and implement temperature TMDLs, including EPA-established TMDLs:

1. Restore and maintain riparian shade,[3] as appropriate, through nonpoint source control programs; permits and waivers, grants and loans, and enforcement actions; support of restoration projects; and coordination

[1] NCRWQCB Res. No. R1-2012-0013 is hereby incorporated by reference.
[2] Section 13247 of the Porter-Cologne Water Quality Control Act requires other state offices, departments, and boards to carry out their activities in a manner that complies with water quality control plans approved or adopted by the state board.
[3] The removal of vegetation that provides shade to a waterbody is a controllable water quality factor. Riparian shade-related temperature TMDL load allocations are based on the concept of "site-specific potential effective shade," which means the shade equivalent to that provided

with other agencies with jurisdiction over controllable factors that influence water temperature, as appropriate.

2. Continue to implement the Sediment TMDL Implementation Policy as a means of addressing elevated water temperature associated with excess sediment discharges. Implement sediment controls consistent with the approach articulated in the Sediment TMDL Implementation Policy to address temperature concerns associated with sediment in areas not impaired by sediment.

3. Examine and address temperature impacts when developing and implementing permits or programs for nonpoint source activities. Consider and implement, where applicable, all available measures to prevent and control the elevation of water temperatures in permit or program development. Such measures shall include, but are not limited to, sediment Best Management Practices and cleanups, memoranda of understanding or agreement with other agencies, prohibitions against waste discharges, management of riparian areas to retain shade, and control and mitigation of tailwater and impoundments. Where appropriate, include monitoring requirements for incorporation into permits, programs, and other orders to confirm management actions required to prevent or reduce elevated temperatures are implemented and effective.

4. Address factors that contribute to elevated water temperatures when issuing 401 certifications, NPDES permits, Waste Discharge Requirements, or Waivers of Waste Discharge Requirements, or Prohibitions.

5. Use other regulatory, executive, and enforcement tools, as appropriate, to address elevated water temperatures and preserve existing cold water resources.

6. Support and encourage restoration projects that are designed to eliminate, reduce, or mitigate existing sources of temperature impairments. Administer, encourage, and support the use of grant funds to facilitate projects that address elevated water temperature concerns. Pursue non-regulatory actions with organizations, landowners, and individuals to encourage the control of elevated water temperatures, watershed restoration, and protection activities.

7. Continue to coordinate with the Division of Water Rights by participating in the water right application and petition process, providing monitoring recommendations, conducting joint compliance inspections, submitting data in support of 401 certifications related to water diversions and/or facilities regulated by the Federal Energy Regulatory Commission, and any other appropriate means to help ensure that the terms of water right permits and licenses are consistent with the water quality objectives for temperature.

8. Coordinate with the Division of Water Rights on the development of instream flow studies and flow objectives, as appropriate.

9. Provide cities, counties, state, and federal agencies guidance and recommendations on compliance with the water quality objectives for temperature. Work with local governments to develop strategies to address the prevention, reduction, and mitigation of elevated water temperatures, including, but not limited to, ordinances, general plans, and other management policies.

10. Identify statewide policies under development with implications for water temperature, collaborate with State Water Board counterparts, and provide recommendations and guidance with respect to this policy.

11. Develop and implement a region-wide water temperature trend monitoring program to assist the Regional Water Board in determining whether this Policy is effectively reducing and preventing elevated temperatures over the long-term.

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by topography and potential vegetation conditions at a site. Shade controls that are effective at correcting temperature impairments also operate to prevent impairments, and provide other water quality protections such as bank stability and filtering sediment and other waste discharges. The Regional Water Board has discretion on how to implement load allocations on a case-by-case basis. This policy is not intended to predetermine precise parameters for riparian shade for a specific location or land use,. Where non-Water Board programs provide riparian shade that result in attainment of water quality standards, the Regional Water Board will rely on and incorporate those programs.

12. Develop and maintain a temperature implementation workplan consistent with the Policy to prioritize efforts, track progress, and identify specific actions to address elevated water temperatures. The temperature implementation workplan shall describe specific actions that will be taken throughout the North Coast Region and set watershed priorities for addressing elevated water temperatures at a watershed-specific level. The temperature implementation workplan shall be presented to the Regional Water Board on a triennial basis.

California Water Boards

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for Environmental Protection

North Coast Regional Water Quality Control Board

Inspection Report
Stanshaw Creek Diversion
Marble Mountain Ranch
Douglas and Heidi Cole, Landowners
92520 Hwy 96, Somes Bar
Siskiyou County
WDID No. 1A15024NSI

Date:	March 9, 2015
To:	Diana Henrioulle – Senior Water Resource Control Engineer Shin-Roei Lee – Supervising Water Resource Control Engineer David Leland – Assistant Executive Officer Taro Murano – Division of Water Rights, Senior Environmental Scientist, Public Trust Unit
From:	Stormer Feiler, Environmental Scientist
Inspection Date:	February 12, 2015
Mailing and Physical Address:	92520 Hwy. 96, Somes Bar, CA 95568
Assessor's Parcel Number:	026-290-200,
Landowner:	Douglas and Heidi Cole
Watershed:	Stanshaw Creek and Irving Creek watersheds within the Ukonom Hydrologic Subarea of the Middle Klamath River watershed

Introduction

At the request of staff of the State Water Resources Control Board's Division of Water Rights Public Trust Unit (DIV), on February 12, 2015, I accompanied DIV staff Skyler Anderson and Michael Vella on an inspection of the Stanshaw Creek diversion. The diversion originates on Stanshaw Creek and discharges to Irving Creek, both tributaries to the Klamath River, near Somes Bar. Diverted water is used for electrical power generation with a pelton wheel and for domestic water supply on the Marble Mountain Ranch.

The diversion has reportedly been in place since the 1800s, supplying a variety of uses to landowners over the years with the most recent landowners being the current owners of the Marble Mountain Ranch, Douglas and Heidi Cole. The DIV is presently in the process of reviewing various aspects of the diversion, in response to complaints of public trust impacts and unauthorized diversion in excess of pre-1914 water rights. The objective of this inspection was to evaluate the existing and potential impacts to water quality and beneficial uses associated with operation of the diversion.

Diversion Description

As noted above, the diversion originates in Stanshaw Creek (tributary to Klamath River at river mile 76.1) and discharges into Irving Creek (tributary to Klamath River at river mile 75). The Point of Diversion (POD) is located on Stanshaw Creek, about 0.68 miles upstream of the Highway 96 crossing[1]. A gravel and cobble push-up dam diverts water from Stanshaw Creek. When flow in Stanshaw Creek is less than approximately 3-4 cfs (typical late spring, summer, and fall flow conditions), most of the creek flow is diverted into the ditch. Conveyance is gravity driven, via lined and unlined ditch, approximately 0.5 miles to a junction where flows are directed either to a water treatment plant or to a forebay and penstock that services the power generation facility and a pressurized irrigation system. Conveyance from the junction to the forebay is via lined and unlined ditch. Lined ditch reaches reportedly consist of half rounds of corrugated PVC, of approximately 30-inch diameter. Discharge from the power plant is conveyed via ditch to an onsite pond. Flows from the pond are conveyed in a ditch to the south across the Ranch to a steep slope that has headcut and is discharging to a tributary stream to Irving Creek.

Watershed and Beneficial Uses Information

Stanshaw Creek is within the Stanislaus Creek, Cal Water Watershed No. 1105.310701, and Irving Creek is in the Irving Creek Cal Water Watershed No. 1105.310702 (Cal Water version 2.2). Both of these streams are tributary to the Ukonom Hydrologic Subarea of the Middle Klamath River Hydrologic Area. The Middle Klamath River is federal Clean Water Act section 303(d)-listed for nutrient, temperature, and organic enrichment/dissolved oxygen impairments. On September 7, 2010, the State Water Resources Control Board adopted a Resolution approving amendments to the Water Quality Control Plan for the North Coast Region to establish: (1) Site Specific Dissolved Oxygen Objectives for the Klamath River; (2) an Action Plan for the Klamath River Total Maximum Daily Loads Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in the Klamath River; and (3) an Implementation Plan for the Klamath and Lost River Basins. On December 28, 2010, the US Environmental Protection Agency approved the TMDLs for the Klamath River in California pursuant to CWA Section 303(d)(2). The Action Plan indicates that temperature impairments in the Klamath are

[1] Diversion description drawn from information contained in "Marble Mountain Ranch Water Rights Investigation: Water Use Technical Memorandum," prepared by Cascade Stream Solutions, LLC, November 18, 2014.

attributable in part to excess sediment loads from anthropogenic sources, and encourages parties responsible for existing sediment sources to take steps to inventory and address those sources.

The Water Quality Control Plan for the North Coast Region (Basin Plan) designates the following existing and potential beneficial uses for the Middle Klamath River and its tributaries within the Ukonom Hydrologic Subarea: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Industrial Process Supply (PRO), Ground Water Recharge (GWR), Freshwater Replenishment (FRSH), Navigation (NAV), Power Generation (POW), Water Contact Recreation (REC-1), Non-Contact Water Recreation (REC-2), Commercial and Sport Fishing (COMM), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species Habitat (RARE), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), Aquaculture (AQUA), and Native American Culture (CUL). Through direct site observation, it appears that the primary beneficial uses the diversion potentially impacts are COMM, MIGR, COLD, SPWN, RARE, and CUL.

The Basin Plan includes a series of water quality objectives designed and intended to protect the beneficial uses of water and guide determining violations of the Basin Plan and Porter Cologne Water Quality Control Act. The following objectives are likely to be associated with water quality violations that occur from the operation and maintenance of the Stanshaw Diversion as observed and discussed herein.

Color
Water shall be free of coloration that causes nuisance or adversely affects beneficial; uses.

Floating Material
Water shall not contain floating material, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.

Suspended Material
Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

Settleable Material
Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses.

Sediment
The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Turbidity
Turbidity shall not be increased more than 20% above naturally occurring background levels. Allowable zones of dilution within which higher percentages can

be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.

Inspection Observations

On February 12, 2015, I accessed the Marble Mountain Ranch and Stanshaw Diversion with Skyler Anderson and Michael Vella. During the course of my inspection, I walked the Diversion from the Point of Diversion in Stanshaw Creek to the penstock for the power plant (upper ditch), I observed a stretch of the lower ditch from the pond to the gully that discharges to Irving Creek (lower ditch), and I observed three established diversion monitoring locations used to measure cumulative daily flows and water losses.

The upper ditch is located upslope of and runs southwest, roughly parallel to Stanshaw Creek, gradually diverging away at an approximately 15-20 degree angle as it approaches the junction before turning southeast and heading toward the forebay and penstock. As noted above, this segment is comprised of lined and unlined reaches. Unlined and lined reaches are confined by an earthen berm on the outboard (downslope) side. Sediment from a number of sources, including Stanshaw Creek, hillslope erosion, and landsliding reportedly deposits in this segment of channel, affecting conveyance capacity. The outboard berm elevation reportedly varies at times due to overtopping, slumping, hillslope failure, and trampling by wildlife.

During the February 12 inspection, I identified 19 areas of concern (Points) on the upper ditch where the outboard berm or upslope cut banks have the potential to fail or have failed, diverting some or all in-channel flows onto native slopes causing erosion and formation of channels delivering sediment towards or into Stanshaw Creek. I observed evidence of three primary types of ditch failure: 1) cut bank slumps block the ditch and cause flows to overtop the berm; 2) water infiltrates into and seeps through the berm, and causes the berm to fail eroding underlying soils and hillslopes; and 3) as noted above, cumulative sediment inputs reduce the ditch capacity and increase the risk of overtopping as ditch capacity is diminished, particularly increasing the potential for failure in areas where the berm is low or has been damaged.

As discussed below, at inspection Points 4 and 5, and visible in image 1, the upper ditch crosses over an unnamed tributary to Stanshaw Creek. The tributary is conveyed under the ditch via culvert. At this location, there is also a culvert that drains a portion of the water in the ditch and discharges it through a shotgunned outlet onto the slope a short distance below the outfall for the stream crossing culvert. The combination of uncontrolled discharges and additional flows into the unnamed tributary has caused significant streambank erosion and channel widening in the tributary downstream of the culvert. The ditch may have historically failed at this location, which has likely also contributed to stream channel enlargement.

I followed the lower ditch from the pond to its discharge point into the gully leading to the unnamed tributary to Irving Creek. Along the lower ditch, the primary area of concern for water quality is Point 20, the headcut erosion where return flows from the Ranch are discharged to Irving Creek.

I do not have GPS coordinates for the points I observed and report on herein; however, the photos provided below include a description of the observed conditions.

Image 1 provides general locations for the Point of Diversion at Stanshaw Creek (Point 1), and the discharge point above Irving Creek (Point 20), which are the start and end points of inspection observations as ordered below.

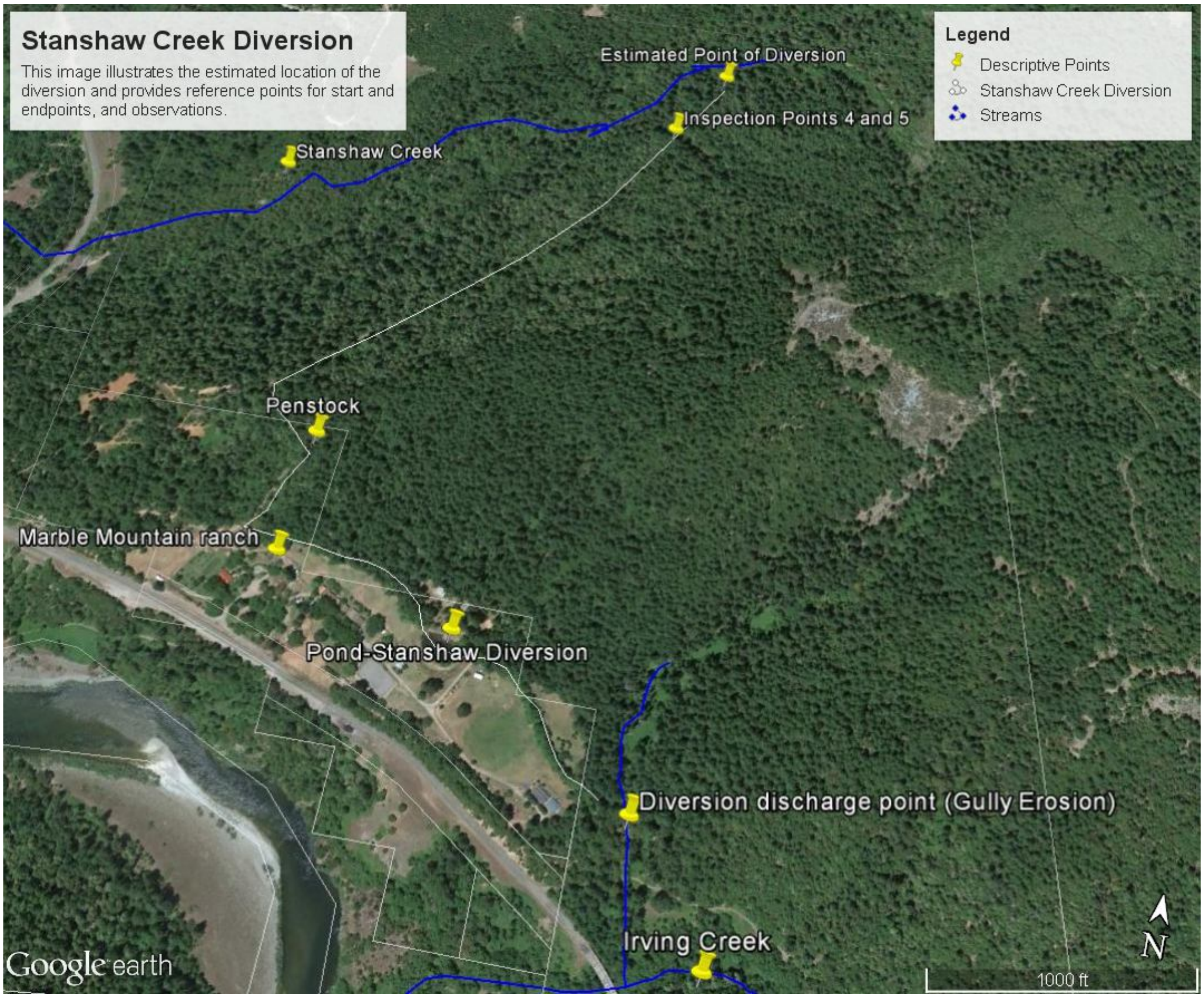

Image 1- shows an overview of the Stanshaw Diversion route and Marble Mountain Ranch. The locations identified are estimated based upon visual observation of the area during the inspection and through subsequent comparison with existing 6/6/2013 Google Earth Pro imagery, Arcview GIS topographic maps, and historic maps of the diversion.

Inspection Photographs and Observations

I have presented photographic images below in order proceeding down the diversion from the point of diversion to the diversions' discharge point into an unnamed tributary to Irving Creek. I took all photos on February 12, 2015. At many of the

Points, I observed multiple issues within a short reach of the ditch, likely posing an increased risk of ditch failure and downslope erosion.

Image 3- shows Point 1, the Point of Diversion. The Stanshaw Diversion flows toward the lower right corner of this image. It appears the rock and cobble diversion structure fails episodically and likely requires periodic modification as Stanshaw Creek's flows change, in order to maintain a diverted flow. (Photos 8459, 8460 and 8461 stitched)

Image 4- shows Point 2, a failure along the outboard berm, approximately 70 feet downstream of Point 1, allowing some of the water in the ditch to flow down to Stanshaw Creek, potentially resulting in erosion and sediment transport. This location appears to have failed repeatedly in the past. The instream flume in the Ditch just downstream of this failure is used to measure flows entering the diversion. (Photo 8454 and 8455)

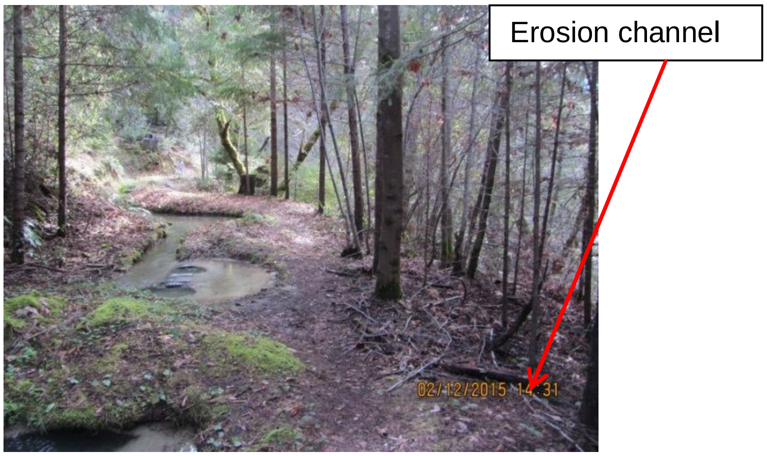

Image 5- shows Point 3, a tank or railroad tank car buried in the ditch channel, likely intended to trap sediment. The tank car is full of sediment. Water flowing in the ditch appears to have overtopped the outboard berm at this location and caused some erosion on the slopes below. (Photo 8467)

Image 6- shows the erosion channel downslope of Point 3.

Image 7- shows the erosion channel downslope of Point 3. The void is visible here in the foreground; the erosion extends downslope an unknown distance.

Image 8- at Point 3, shows a closer view of the buried tank car with stored sediments visible. (Photo 8450)

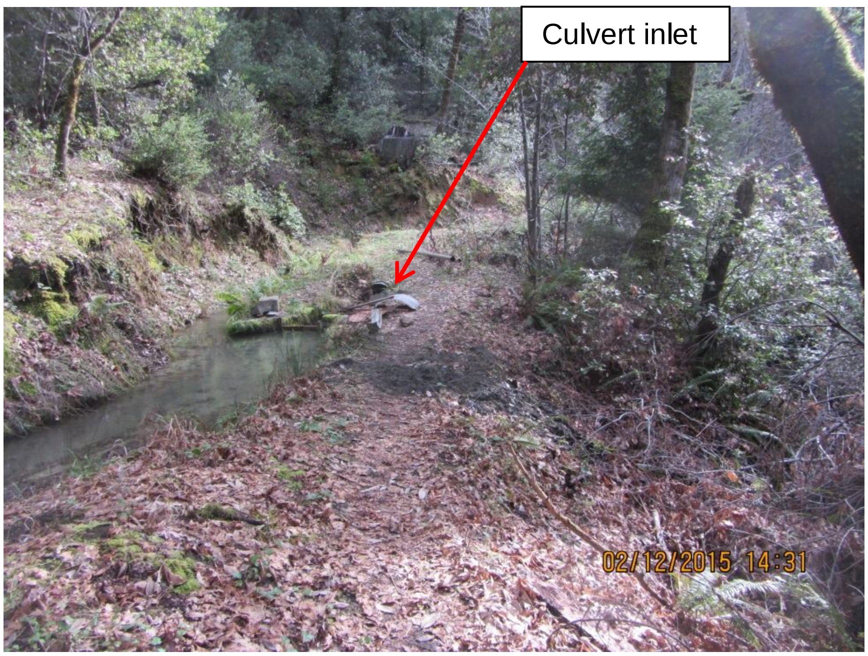

Image 9- at Point 4, shows the partial diversion of the ditch into an unnamed tributary to Stanshaw Creek through the inlet of a 12-inch culvert, before the diversion ditch is routed across the stream in a lined ditch. The culvert is shotgunned, which appears to have caused significant instream erosion in the downslope channel. The stream above the crossing is 3-4 feet wide at bankfull width; the eroded stream channel below the diversion crossing is 12-14 feet wide, and does not appear stable. At this location, I also observed muddy soils in the berm adjacent to the ditch, indicating that seepage from the ditch is saturating surrounding soils, which may lead to catastrophic failure of the ditch. (Photo 8441)

Image 10- at Point 4, shows a closer look at the seepage in the berm; note the muddy soils in the foreground. (Photo 8441 cropped)

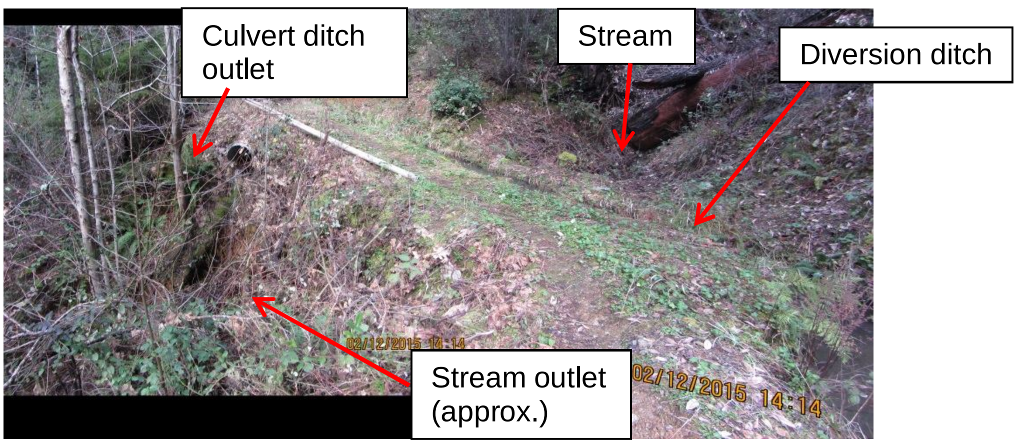

Image 9- at Point 5, shows the shotgunned 12-inch ditch culvert outlet, diversion ditch and native stream channel flowing under the diversion ditch. (Photos 8442, 8443, 8444, 8445 composite)

Image 10- shows the unnamed stream channel above Points 4 and 5; the upslope active bankfull stream channel width is approximately 3-4 feet.

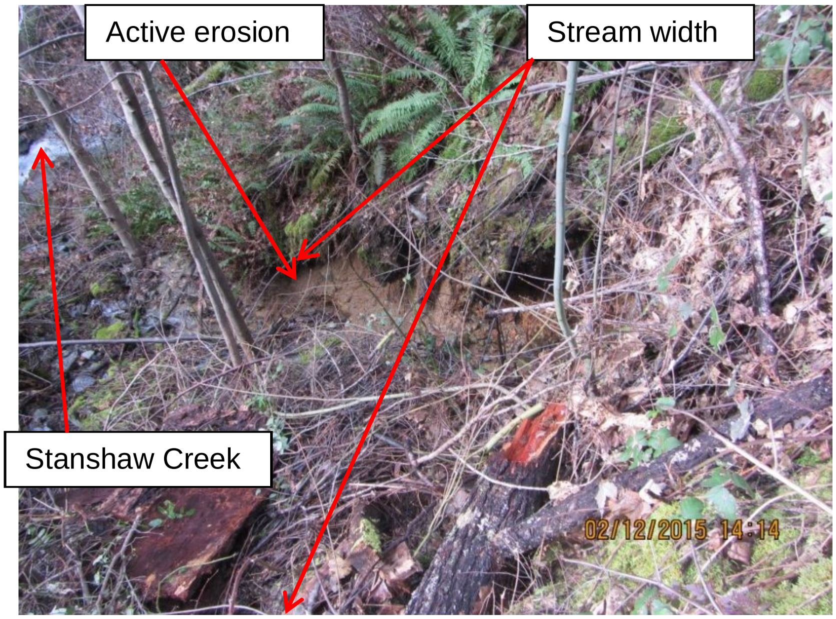

Image 11- shows the unnamed stream channel downstream of Point 5, and the erosion caused by water draining from the shotgunned culvert. Stanshaw Creek can be seen a short distance downslope. I conservatively estimate that this site has delivered 150-300yds³ of sediment and debris to Stanshaw Creek over the life of the Diversion. (Photo 8478)

Image 12- shows Point 6, where the diversion channel is full, leaving no freeboard should it rain or the ditch receive a bank slump upstream. It appears the outboard berm may have failed in this area in the past, and at present is seeping, indicating that a portion of the berm may be saturated. Stanshaw Creek is within 200 feet; any failure here likely results in direct delivery of sediment and erosional debris. The flume section visible in the photo appears to have been installed to remedy previous ditch failures and/or to prevent future failures.

Image 13- point 7, shows the end of the flume in the previous photo; note the black plastic sheeting on the outboard slope face, and the low outboard berm as the diversion ditch exits the flume. The lack of freeboard creates a high potential for overtopping and erosion. The presence of the pipe section and plastic sheeting in the area suggests that the berm or underlying slope in this area has likely failed in the past. (Photo 8483)

Image 14- shows point 8, an approximately 150-foot section of the channel downstream of Point 7, where the low berm and full ditch likely creates a high potential for berm or slope failure, erosion, and sediment transport downslope. I observed concrete blocks at various locations along the outboard edge of the berm throughout this segment, likely to rebuild or reinforce berm sections. (Photo 8486)

Image 15- shows Point 9, a significant failure point, likely caused by a cut bank slump filling the diversion channel and diverting the stream flow. Note the cut bank slump above and the erosion void downslope. This failure likely accelerated erosion on lower slopes and into the nearby streams. (Photo 8490 and 8491 composite)

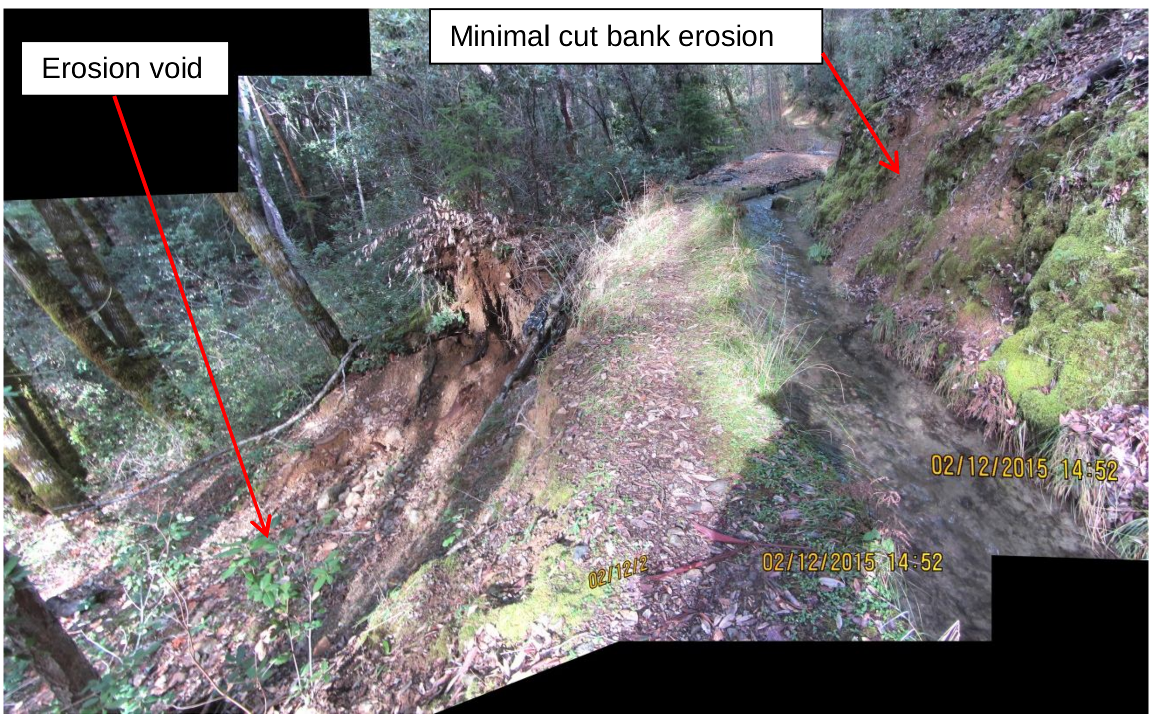

Image 16- Point 10 is an area of concern that includes an erosional channel likely formed by a berm failure and active erosion visible on the cut bank. I observed active cut bank erosion on many of the upper slopes above the diversion ditch and expect that bank slumps have and are contributing significantly to ditch failures. (Photos 8495, 8496, 8497, and 8498 composite image).

Image 17- Point 11 is another 150-200 feet of ditch with a low freeboard and evidence of past failures; this ditch segment leads to a section of ditch subject to a recent bank failure. I observed erosion scars on the lower slopes that are now overgrown with ferns and small shrubs. (Photo 8499)

Image 18- Point 12 shows evidence of a recent bank failure that caused water to overtop the outboard berm and erode slopes below the ditch. The outboard ditch shows signs of seepage throughout this length. Note the sand bags and fresh soils along the outboard berm, indicating recent repairs. Also, note the 50-75 foot section of the cut bank with exposed soils. (Photo 8503)

Image 19- Point 12, closer view of berm repair made with ready crete concrete sacks and soils. Note the saturated soils along the outboard berm where water is seeping. (Photo 8510)

Image 20- Point 13 shows a large continuous cut bank slump that extends for approximately 220 feet. Based on my observations, it appears the cut bank slumped along this stretch over this past winter, delivering approximately 10 yds³ of sediment into the ditch, blocking the channel, and causing water to overtop the berm and erode the lower slopes. Cut banks are often chronic sources of erosion, delivering additional sediment to streams and ditches each year.

Image 21- Point 14, a cut bank that appears to have slumped in the recent past, causing water to overtop the berm and erode the berm and lower slopes. (Photo 8520 and 8521 composite)

Image 22- Point 15 shows an active cut bank slump, and evidence of recent repairs to the ditch and berm. (Photo 8523)

Image 23- Point 16, another cut bank that has a high risk of failure. Note the steep, near vertical slope of this cut bank, which indicates that the bank is still likely to erode. The roots hanging out of the cut bank are indicators of the erosion that has occurred. Most cut banks are originally constructed in a planar form with no visible roots protruding. Over time the cut bank erodes, exposing the roots, and leaving an indicator as to the amount of soil that has eroded or slumped. (Photo 8525)

Image 24- Point 17 shows a segment of channel with an active cut bank slump and evidence of recent repairs to the outboard berm.

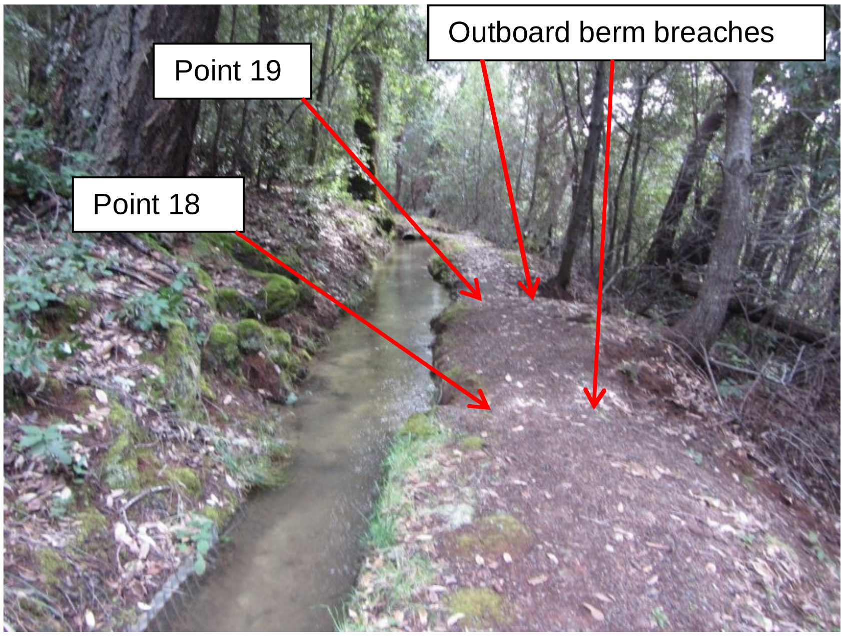

Image 25- shows two locations, points 18 and 19, where the outboard berm has apparently breached in the past, resulting in gully erosion on lower slopes. The failure at Point 19 resulted in the formation of a gully channel for a long distance down the slope, and may have contributed a significant sediment load to the Klamath River and possibly Stanshaw Creek. I did not follow the gully all the way down the slope, but did see an erosion channel from the lower road.

Image 26- Point 20 is the headcut upslope from Irving Creek. This is where tailwater from the Stanshaw Diversion is discharged to an unnamed stream, tributary to Irving Creek. This area is actively eroding. Several trees appear to have fallen recently through erosion of their root masses. I estimate that the headcut erosion has delivered between 1500-2200 yds^3 of sediment to the Irving Creek watershed. (Photo 8529)

Summary

In summary, I observed 19 Points in the upper ditch where the outboard berm has been or may be compromised by either erosion of the berm, saturation of the berm, or sediment loading to the ditch from cut bank failures; the ditch retains the potential to fail in the future from one or a combination of these mechanisms.

On the lower ditch, I observed evidence of significant active erosion occurring at the downstream discharge point to Irving Creek, representing a chronic source of sediment delivery into Irving Creek and, thence, to the Klamath River.

This list of observation points is not exhaustive, and my inspection was not a complete inspection of the entire diversion system. The points selected for discussion provide a basis for analyzing the long term and short term sediment-related impacts of the diversion ditch on water quality. Based upon the observations as provided in the body of this report, portions of the outboard berm and/or the upper ditch have likely been failing periodically since the original construction of the diversion ditch, delivering sediment and debris to Stanshaw Creek. Each time the berm or slope fail, there is the potential for mass erosion of earthen material from lower slopes. In some locations, these erosional gullies are visible and show the age of the failure through the relative recovery of vegetation and duff recruitment within the features.

As the ditch is maintained at a low gradient, approximately 3% grade, the ditch is both transporting fine sediments (colloidal materials) and storing sediment (coarse sediment and consolidated earthen deliveries). Storing sediment reduces the capacity of the ditch and increases the risk of mass failure of the berm through saturation and through berm overtopping and erosion. When sediment is transported out of this ditch system the result is a direct delivery into the pond on the Marble Mountain Ranch, or possibly to the downstream tributary to Irving Creek.

It is apparent that if the diversion system is maintained and operated in the present fashion, it will continue to represent a chronic source of sediment discharge to surface waters in the Middle Klamath River watershed. The Regional Water Board has received at least one complaint over the years regarding water quality impacts associated with the Diversion, specifically, in January 2011 staff received a complaint alleging that repeated failures of the diversion were impacting aquatic resources in the Klamath River and its tributaries through excessive sediment loading. My observations tend to support these allegations, and suggest that further such impacts will occur in the future. In my opinion, the diversion ditch likely represents a chronic source of sediment discharge to Stanshaw Creek and Irving Creek.

I did not inspect the reaches of Stanshaw Creek or Irving Creek downstream of the Stanshaw Diversion, so did not confirm evidence of recent sediment discharges to either Creek or to the Klamath River; however, I did inspect the site of a 2013 Fisheries Restoration Grant (FRGP), Grant # P1110319, which involved the removal of 560 cubic yards of stored sediments at the confluence of Stanshaw Creek and the Klamath River to restore a large backwater pool to provide refugial habitat for salmonid species. A report describing this project indicates, in part, that "[o]riginating from Stanshaw Creek, the bulk of the sediment plug was deposited during the 2005/2006 flood event when the upstream ditch diversion to Marble Mountain Ranch overtopped causing severe gully erosion." Here, I confirmed that at least at present, the backwater pool still appears to be functioning as intended.

The ditch has been in operation for a number of years and, as noted above, supplies water for domestic needs and power generation for the Marble Mountain Ranch. I briefly researched the alternator in use to generate electricity for the ranch. Upon initial evaluation, it appears that there may be opportunities to more efficiently operate the pelton wheel, which would result in significant reductions in the volume of water necessary for power generation.

Water quality is affected by a number of mechanisms, in this case observations indicate that 1) the operation of the Stanshaw Creek Diversion is likely influencing increased sediment loading on the Klamath River, and 2) the flows in Stanshaw Creek provide an important source of water to a refugial habitat for all life stages of salmonids occupying the Klamath River. Cold clean water is the basis of salmonid survival and properly functioning conditions supportive of all beneficial uses. The diversion is losing water through evaporation and seepage to surrounding soils, the loss of water is likely contributing to failures of the berm and erosion resulting in sediment contributions to Stanshaw Creek and Irving Creek. In addition, the loss of water is an impact on water quality when one considers that the diversion takes cold water from a native stream, and after use, places it in another location without the apparent habitat values of its original native location. Finally, as the water passes through the Stanshaw diversion system and crosses through the Marble Mountain Ranch, it may be subject to changes in characteristics based on potential pollutant inputs or increases in temperature. I did observe potential pollutant sources of concern while viewing the diversion system on the Marble Mountain Ranch, primarily domestic livestock grazing. I did not note any locations where the ditch was exposed to run off from livestock grazing or that the ditch was prone to intercepting pollutants generated on the ranch. However, I did not evaluate the entire system on the Ranch, nor collect any samples or take any measurements.

Recommendations

This diversion and its operation can likely be improved significantly, to both reduce sediment discharges, and increase native instream cold water resources in Stanshaw Creek, and the Klamath River basin. To facilitate such an improvement to the benefit of water quality, I recommend the following information be considered in evaluating the current and future operation of the Stanshaw Creek Diversion. Some of this information may already be available or may be under development. Information should be developed by a California licensed professional or professionals with relevant experience.

- Water balance, i.e., how much water enters the Stanshaw diversion, how much discharges, how much is demonstrably applied to consumptive uses within the Marble Mountain Ranch

- Water quality review, i.e., sampling/testing of water entering the Stanshaw diversion and discharging from the Marble Mountain Ranch, identification of factors or features that may be contributing to changes, if any, to water quality– in vs. out
- Review onsite water needs for domestic uses
- Review opportunities to optimize water needs for power generation (this may include reviewing operational requirements for the existing pelton wheel to identify ways to optimize efficiency and/or consideration of alternative hydropower generation systems)
- Review opportunities to reduce water loss or head loss
- Design a delivery system that optimizes water conservation while fulfilling onsite water needs

<u>Outfall/Irving Creek tributary</u>
Regional Water Board staff recommend that an appropriately qualified California licensed professional experienced in Geology and stream restoration evaluate the diversion outfall tributary to Irving Creek and develop a stream restoration plan to restore stream side vegetative and hydrological functions of the tributary, if applicable, and to ensure the long term recovery of the affected streams; and 2) replant slopes and streamside areas with native vegetation to prevent erosion and sediment delivery. The plan shall include provisions to ensure that continued use of this tributary, either for diversion outfall flow or for transport of seasonal flows through the ranch property, does not create new or exacerbate existing erosion.

<u>Upper Ditch</u>
Water quality recommendations regarding the upper ditch will vary depending on whether the ditch or ditch alignment is to be maintained to any degree as part of the delivery system, or whether it is to be taken out of service altogether. Specifically, if/when the ditch is to be taken out of service, Regional Water Board staff recommend that a licensed California professional (or professionals) with experience including hydraulic engineering, geology, and instream and hillslope restoration, develop a plan to decommission the ditch by removing the outboard berm, outsloping the channel as appropriate/necessary to disperse drainage, and stabilizing and replanting all bare soils as necessary on the upslope, channel, berm material, and slopes below the ditch to minimize the potential for continued or future erosion, slope failure, and/or sediment delivery to downslope receiving waters.

Alternatively, for any delivery system that will require that the ditch, ditch alignment, or segments thereof be retained in service, Regional Water Board staff recommend that an appropriately qualified California Licensed professional (or professionals) with experience including hydraulic systems analysis; design, construction and maintenance of water transport and delivery systems; stream and hill slope restoration; and geologic analysis of slope stability:

a) Evaluate the entire ditch system, identify all features and locations susceptible to failure by any of the physical processes and mechanisms described herein, (including but not limited to ditch seepage, berm fill saturation, upslope cutbank stability), identify locations where there is potential for sediment delivery to receiving waters in the event of a failure, develop mitigations including design and construction standards and an implementation schedule as necessary to complete the defined scope of work,

b. Develop and submit for approval a ditch operation and maintenance plan that includes an inspection and maintenance schedule, specifying those measures to be incorporated/ constructed and steps to be taken to ensure that the slopes above the ditch do not fail into and block the ditch, that water seepage from the ditch does not saturate underlying materials and result in failure, that the ditch does not overtop the berm, that the berm does not fail, and that sediment does not deliver from the ditch to waters of the state.

For either alternative, the ditch repair or decommissioning plan shall include specifications to restore the affected stream/unnamed tributary that crosses at inspection points 4/5, replant with native vegetation, and to protect streams from any further impacts or discharges associated with the ditch.

Additional Measures to Protect Water Quality

Regional Water Board staff recommends that an appropriately qualified licensed California professional or professionals conduct the following reviews and develop plans to ensure or implement the following:

a) Assess slopes between the upper ditch and Stanshaw creek and identify any erosional issues associated with the ditch that should be corrected to prevent or minimize sediment delivery to Stanshaw Creek and/or to the Klamath River, and propose and provide a schedule for implementing corrective measures.

b) Assess segments of Stanshaw and Irving Creeks downstream of the diversion inlet & outlet points to identify and map any evidence of damage or sediment storage with potential for restoration. In the event the survey identifies areas where stored sediments can be remediated, or past discharges from the ditch have created erosional features that have the potential to actively erode with rainfall and transport sediment into downstream receiving waters, then develop a plan to remediate and describe any potential concerns with implementing the scope of restoration work identified.

c) Assess the potential for pollutant inputs and/or changes to water quality over the segment of lower ditch passing through the property and discharging at the outfall to Irving Creek. A visual assessment to identify potential locations where pollutants may be added or temperatures may increase coupled with samples collected at the upstream and downstream end of this segment may be adequate for an initial assessment and help to focus additional assessment if necessary. Constituents of concern for sampling/testing may include but are not necessarily limited to nutrients, fecal coliform, total coliform, BOD, temperature, blue green algae and any other potential contaminant of concern identified through the visual assessment.

General Recommendations for Restoration Plans

Restoration plans prepared per recommendations above should include or specify, as applicable/appropriate:

a) Design and construction standards specifications and designs for stream restoration, surface drainage controls, erosion control methods and standards for unanticipated precipitation during restoration, compaction standards, an implementation schedule, a monitoring and reporting plan, and success criteria.

b) Map(s) and/or project designs at 1:12000 or larger scale (e.g., 1:6000) that delineate existing site conditions including existing channels, the projected restored slopes and stream channels, illustrating all restoration plan work points, spoil disposal sites, re-vegetation planting areas, and any other factor that requires mapping or site construction details to complete the scope of work

c) Best management practices to be applied for all work associated with construction activities affecting, or having the potential to impact, surface waters.

d) Proposed time schedules for completing work, taking into account time needed to receive any necessary permits from State, County and/or federal agencies. In the event that the Water Boards impose deadlines for work completion, proposed work schedules must adhere to those deadlines.

e) Proposed program to monitor, assess, maintain, and report on the success of restoration efforts. Restoration monitoring plans should include regularly scheduled inspections, and established monitoring photo points of sufficient number to document the site recovery for five years or until the Site is restored, mitigation is complete, vegetation is reestablished, erosion is no longer ongoing and monitoring is no longer necessary.

Areas that have been revegetated with native plants must be monitored for five years following planting, including a minimum of two years of monitoring following irrigation, if any. Revegetation success criteria for tree and shrub plantings is a minimum of 85%, and may require one or more replanting efforts, weeding, exotic species removal, watering, etc.

Photo-documentation points should include restoration work areas, revegetation areas, and affected tributaries, up and downstream of restoration sites, and individual work sites where construction occurs within the ditch (upper or lower). Monitoring plans should include a site map with the photo-documentation points clearly marked. Restoration sites, affected watercourse segments, and other photo-documentation points should be photographed immediately prior to and immediately after implementing restoration and/or mitigation work, and pre- and post-project photos should be included with the map as part of the as-built report, to be submitted with the next regular monitoring report following the completion of restoration work.

Restoration sites should be monitored periodically including, at a minimum, inspections prior to, during, and towards the end of each rainy season (for example: October 15, January 5, and March 1 of each year), and monitoring reports should be submitted within 30 days of each inspection. Monitoring Reports should include a summary of any monitoring observations or results (in the event that monitoring includes sampling); describe any corrective actions made or proposed to address any failures of the Site and restoration measures (features to be assessed for performance and potential failure should include, but are not limited to, erosion controls, stream bed and bank erosion, sediment discharges, work, and re-vegetation); and include narrative and photo documentation of any necessary mitigation and evidence of successful restoration and Site recovery for five years, or until Site recovery is considered complete.

Staff recommend that when applicable restoration sites are stable and monitoring programs have been fulfilled, a Summary report be submitted for staff review, and that a site representative arrange for an inspection with Regional Water Board staff to determine whether restoration has been adequately completed and conditions representing water quality violations have been successfully corrected.

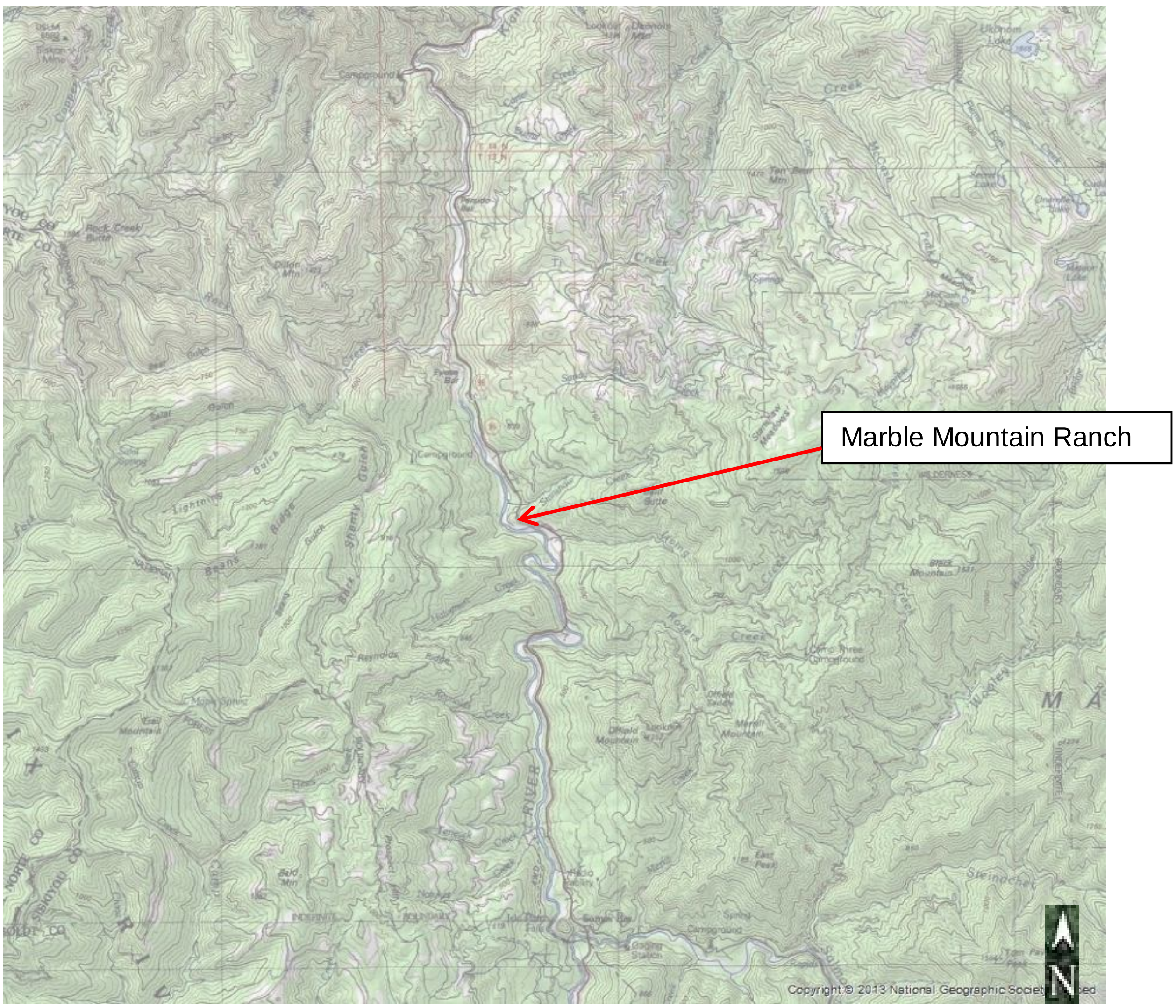

Image 27 shows the general location of the Marble Mountain Ranch.