TEMPLATE SAFE HARBOR AGREEMENT FOR CONSERVATION OF COHO SALMON IN THE SHASTA RIVER

This Template Safe Harbor Agreement is made and entered into by the National Marine Fisheries Service, the California Department of Fish and Wildlife, the Shasta Watershed Conservation Group, and the undersigned Permittees.

1. Purpose. This Template Safe Harbor Agreement establishes the general requirements for the National Marine Fisheries Service, under authority of Endangered Species Act section 10(a)(1)(A) and implementing rule and policy, to issue Enhancement of Survival Permits to non-federal landowners in the Shasta River Basin for the purpose of promoting the conservation, enhancement of survival, and recovery of the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of coho salmon.

2. Definitions.

2.1. **Applicable Law** means federal and state laws, including rules, regulations and policies which are applicable to the impacts on Covered Species resulting from (a) Routine Agricultural Activities and (b) implementation of Site Plan Agreements.

2.2. **Avoidance and Minimization Measures or AMM** means measures to avoid or minimize adverse effects associated with Routine Agricultural Activities or Beneficial Management Activities, and Return to Baseline, for an Enrolled Property.

2.3. **Baseline Conditions** means the habitat conditions for Covered Species on an Enrolled Property when NMFS approves the Site Plan Agreement for that Enrolled Property.

2.4. **Beneficial Management Activities** means activities to benefit the Covered Species, as specified in the Site Plan Agreement for each Enrolled Property. The term includes associated Avoidance and Minimization Measures.

2.5. **CDFW** means the California Department of Fish and Wildlife.

2.6. **CESA** means the California Endangered Species Act, Fish and Game Code §§ 2050 *et seq*.

2.7. **Consistency Determination** means the determination by CDFW pursuant to Section 5.3.

2.8. **Covered Species** means the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of coho salmon, as described in Section 4.1.

2.9. **Elevated Baseline Conditions** means certain Baseline Conditions improved as a result of certain Beneficial Management Activities.

2.10. **Enrolled Property** means the interest in land or water subject to a Site Plan Agreement issued pursuant to the procedures described in Section 5 of this Template Safe Harbor Agreement.

2.11. **ESA** means the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq*.

2.12. **Enhancement of Survival Permit or ESP** means a permit that NMFS issues to a Permittee for an Enrolled Property under authority of ESA section 10(a)(1)(A), 50 C.F.R. § 222.308, and the Safe Harbor Policy.

2.13. **NEPA or National Environmental Policy Act** means the statute codified at 42 U.S.C. §§ 4321 *et seq.*

2.14. **Net Conservation Benefit** means the cumulative benefits of the Beneficial Management Activities on an Enrolled Property, taking into account the term of the Template Safe Harbor and Site Plan Agreement and any off-setting adverse effects attributable to incidental take allowed by the ESP. Such benefit may be an increase in the Covered Species' population; the enhancement, restoration, or maintaining suitable habitat within the Enrolled Property; or both.

2.15. **NMFS** means National Marine Fisheries Service.

2.16. **Permittee** means a non-federal landowner who signs this Template Safe Harbor Agreement, as the basis for signing a Site Plan Agreement and receiving an ESP.

2.17. **Party or Parties** means the entities who sign this Template Safe Harbor Agreement.

2.18. **Regulatory Assurances** means the assurances described in Section 7 below.

2.19. **Return to Baseline** means: the activities that a Permittee would undertake and that return the Covered Species' population or extent or quality of habitat to Baseline Conditions. If Elevated Baseline Conditions are specified, a Permittee may return conditions to Elevated Baseline Conditions only, and such activities may occur only during the period starting when a Permittee provides notice of intent to terminate an ESP for its Enrolled Property, until termination, pursuant to the procedures described in Section 6.8 below.

2.20. **Routine Agricultural Activities** are lawful practices for production of livestock, pasture and hay, and other crops, including, but not limited to, cultivation, growing, harvesting, and replanting of pasture and other crops; diversion of water, irrigation, irrigation run-off; preparation for market, vehicle

operation, watering, and moving of livestock, and operation and maintenance of facilities associated with the production of livestock, pasture, and hay performed by a Permittee as described in the Permittee's Site Plan Agreement.

2.21. **Safe Harbor Policy** means the final Safe Harbor Policy published by NMFS and the United States Fish and Wildlife Service at 64 Fed. Reg. 32,717 (June 17, 1999).

2.22. **Site Plan Agreement** means a written agreement between NMFS and a Permittee, specific to an Enrolled Property, that describes: (a) Baseline and Elevated Baseline Conditions on the Enrolled Property; (b) Beneficial Management Activities and Avoidance and Minimization Measures that the Permittee will undertake; and (c) any activities that the Permittee will implement during Return to Baseline Conditions.

2.23. **Template Safe Harbor Agreement** means this agreement developed under ESA section 10(a)(1)(A), 50 C.F.R. § 222.308, and the Safe Harbor Policy, that establishes general requirements for Site Plan Agreements and ESPs for Permittees in the Shasta Basin, California.

2.24. **SWCG** means the Shasta Watershed Conservation Group, a 501(c)(5) nonprofit corporation organized under the laws of California.

3. Recitals.

3.1. NMFS may issue ESPs to non-federal property owners and other entities who participate in a Safe Harbor Agreement that complies with ESA section 10(a)(1)(A), 50 C.F.R. § 222.308, and the Safe Harbor Policy.

3.2. The Parties have undertaken to develop this Template Safe Harbor Agreement to facilitate issuance by NMFS of ESPs to Permittees in order to provide a Net Conservation Benefit for Covered Species in the Covered Area (defined below).

3.3. This Template Safe Harbor Agreement and each associated Site Plan Agreement will support the issuance of ESPs to Permittees in the Covered Area. As described in Section 6 below, each Permittee will implement its Site Plan Agreement for its Enrolled Property and will receive Regulatory Assurances as provided in the ESP issued to each Permittee.

3.4. This Template Safe Harbor Agreement informs the Parties of the terms and conditions that will apply to each Permittee in addition to specific conditions contained in each Permittee's ESP. Each Site Plan Agreement and ESP will provide more specificity to the terms or conditions in this Template Safe Harbor Agreement, or additional terms or conditions beyond what appears in this Template Safe Harbor Agreement, that are applicable to a particular Enrolled Property. This Template Safe Harbor Agreement, any Site Plan Agreement, and

related ESP, taken together provide the applicable terms and conditions for the particular Permittee and will be reviewed by CDFW for its Consistency Determination.

3.5. To support issuance of an ESP, NMFS must find that the implementation of activities required in each Site Plan Agreement will result in a Net Conservation Benefit for Covered Species on each Enrolled Property.

3.6. A Permittee may, specific to its Enrolled Property, elect to withdraw from this Template Safe Harbor Agreement, its Site Plan Agreement, and the related ESP pursuant to the procedures stated in Section 6.8 below and applicable regulations located at 50 C.F.R. § 222.306(d).

4. Scope.

4.1. Covered Species. This Template Safe Harbor Agreement covers the Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of coho salmon (*Oncorhynchus kisutch*), which was listed as a threatened species under the federal Endangered Species Act (ESA) in 1997; this listing decision was reaffirmed in 2005. See 62 Fed. Reg. 24588 (May 6, 1997), 70 Fed. Reg. 37160 (June 28, 2005).

4.2. Covered Area. This Template Safe Harbor Agreement applies to the Covered Area, as described in Appendix 1 and in NMFS' Findings of Net Conservation Benefits.

4.3. Covered Activities. This Template Safe Harbor Agreement applies to Routine Agricultural Activities, Avoidance and Minimization Measures, and Beneficial Management Activities which are defined in this Template Safe Harbor Agreement and are further described in each Site Plan Agreement.

5. Enrollment of a Property.

5.1. Content of Proposed Site Plan Agreement. A proposed Site Plan Agreement will include the following information for the affected property:

5.1.1. General description, including map and water rights;

5.1.2. Description of Baseline Conditions;

5.1.3. Description of any Elevated Baseline Conditions;

5.1.4. Description of Routine Agricultural Activities, applicable Avoidance and Minimization Measures, and Beneficial Management Activities, including a schedule and other terms and conditions for implementation;

5.1.5. Monitoring, reporting, and consultation requirements;

5.1.6. Description of potential and existing funding source(s) and timeline for the Permittee to carry out Beneficial Management Activities, Avoidance and Minimization Measures, and monitoring, reporting, and consultation requirements;

5.1.7. Other information consistent with the terms and conditions of the Template Safe Harbor Agreement and each ESP.

5.2. Decision on Site Plan Agreement. Each Permittee will submit to NMFS a proposed Site Plan Agreement and ESP application.

5.2.1. Notice. Upon its acceptance of an ESP issued by NMFS, each Permittee shall execute this Template Safe Harbor Agreement memorializing the Permittee's agreement to implement terms contained herein.

5.2.2. Review. NMFS will review each proposed Site Plan Agreement to determine whether enrollment of the property will result in a Net Conservation Benefit for the Covered Species. In such review, NMFS will take into account: the effects of implementation of the Routine Agricultural Activities, Beneficial Management Activities, and Avoidance and Minimization Measures, as provided in the Site Plan Agreement, the term of the ESP, and the Return to Baseline.

5.2.3. Action. If it makes a determination of Net Conservation Benefit, NMFS will issue an ESP to the Permittee. The ESP will require implementation of Avoidance and Minimization Measures and Beneficial Management Activities, including those associated with Return to Baseline, as provided in the Site Plan Agreement. The ESP will provide Regulatory Assurances consistent with Section 7 below.

5.2.4. Effective Date and Term.

A. This Template Safe Harbor Agreement, a Site Plan Agreement, and related ESP will become effective (the "Effective Date") with regards to the applicable Permittee upon the last date of the following: (i) the Site Plan Agreement is signed by NMFS and the Permittee for the Enrolled Property; (ii) the related ESP issued by NMFS is signed by the Permittee, and (iii) NMFS, CDFW, and the Permittee sign this Template Safe Harbor Agreement.

B. The Template Safe Harbor Agreement, Site Plan Agreement, and related ESP will each have the same expiration date which will be stated in the documents at the time of signature, and will be

approximately 20 years after the effective date ("Expiration Date").

5.2.5. Renewal.

A. One year prior to the Expiration Date of an ESP, the Parties will meet to decide whether to extend the term of this Template Safe Harbor Agreement. In addition, each Permittee, NMFS, and CDFW will meet to decide whether to extend the term of its Site Plan Agreement and renew its ESP.

B. Although the ESPs authorize the Permittees to return to Baseline Condition and Elevated Baseline Condition on an Enrolled Property upon the Expiration Date, it is at both NMFS' and the Permittee's discretion whether or not to renew the ESP.

C. NMFS will contact the Permittee at least ninety (90) days prior to the Expiration Date to notify the Permittee of the upcoming renewal opportunity. The Permittee can either request that NMFS extend the term of the ESP, or allow the ESP to expire. NMFS's failure to contact the Permittee within the ninety days does not affect the ESP's Expiration Date.

D. Prior to renewal of an ESP, NMFS must reevaluate this Template Safe Harbor Agreement, applicable Site Plan Agreement, and related ESP to determine if Template Safe Harbor Agreement, Site Plan Agreements and associated ESPs will continue to meet the net conservation benefit standard at the time of renewal. If the status of the Covered Species has declined (on the Enrolled Property or elsewhere) since the ESP, an "as-is" renewal of the ESP may no longer meet the Safe Harbor Agreement issuance standards.

E. For renewal of an ESP, additional conservation measures or conservation measures that are more extensive than those required in this Template Safe Harbor Agreement, applicable Site Plan Agreement, and related ESP may be necessary.

F. Any renewal of an ESP would require a new Consistency Determination by CDFW for take authorization under State law.

5.3. CDFW's Consistency Determination. If NMFS issues an ESP to a Permittee, CDFW will review this Template Safe Harbor Agreement, the Site Plan Agreement, and related ESP for consistency with Fish and Game Code section 2089.22, including the criteria stated in Section 2089.6, upon request by a Permittee.

5.3.1. If it determines that the ESP is consistent with these requirements, CDFW will issue to the Permittee a Consistency Determination within thirty (30) days of receiving the request.

5.3.2. If there are any substantive changes to a Permittee's Site Plan Agreement or the Template Safe Harbor Agreement, or if NMFS amends or replaces the ESP, the affected Permittee will be required to request and obtain a new Consistency Determination from CDFW for take authorization under State law.

6. **Implementation**.

6.1. General. Each Permittee will implement the Beneficial Management Activities, Avoidance and Minimization Measures, and Monitoring, as provided in this Template Safe Harbor Agreement, the applicable Site Plan Agreement, and related ESP, including the schedule and other terms and conditions for such implementation. Any facility or structure constructed for purposes of a Site Plan Agreement or ESP will be operated as designed.

6.2. Special Circumstances.

6.2.1. Risky Activities. A Site Plan Agreement may specifically identify certain activities as involving particular uncertainty or other potential risks to the Covered Species. Prior to conducting such activities, a Permittee will follow the specific procedures identified in their Site Plan Agreement and the Covered Activities and Avoidance and Minimization Measures (Appendix 3), or related ESP, which may include: (a) Notice to NMFS and CDFW prior to conducting such activities, (b) a survey to determine the presence and distribution of any Covered Species, and/or (c) a determination by NMFS and CDFW whether and when the activity may proceed.

6.2.2. Emergency. A Permittee will provide written Notice to NMFS and CDFW regarding the occurrence of natural or man-caused emergency, including but not limited to, a storm event or accidental water discharge, which may negatively affect habitat conditions for Covered Species on an Enrolled Property. The Permittee will notify NMFS and CDFW prior to, during, or immediately after the emergency event. NMFS and CDFW will develop AMMs in coordination with the permittee for the particular flood or other emergency event. Once AMMs have been developed to address the emergency, the Permittee will notify NMFS and CDFW within fourteen (14) days from the beginning of the emergency work per Fish and Game Code 1610.

6.2.3. Injury or Mortality of Covered Species. Permittees will provide Notice to NMFS and CDFW if the Permittee observes injury or mortality of

Covered Species on its Enrolled Property. Such Notice shall be provided as soon as possible but not later than 48 hours after the observation by the Permittee.

6.3. Access to Enrolled Property.

6.3.1. General. A Permittee will allow NMFS, CDFW, or SWCG to have access to an Enrolled Property to (a) inspect for implementation of Beneficial Management Activities, (b) monitor, stock or remove the Covered Species, or to carry out related management activities, and (c) monitor the effectiveness of each Site Plan. Such access will be subject to conditions identified in each Site Plan Agreement. Unless specified otherwise in the applicable Site Plan Agreement, such access will be subject to reasonable notice, not less than seven (7) days in advance, and conditioned to avoid interference with commercial and other private uses of the Enrolled Property by the Permittee. SWCG will not stock or remove the Covered Species, or carry out related management activities unless they are authorized to do so under Applicable Law.

6.3.2. Special Circumstances. In the circumstances described in Sections 6.2 and 6.8, a Permittee will allow access to NMFS and CDFW for emergency salvage or relocation of affected Covered Species.

6.4. Assistance with Implementation.

6.4.1. Technical Assistance. NMFS and CDFW will provide technical assistance to Permittees in the implementation of the Site Plan Agreements.

6.4.2. SWCG. The SWCG will make reasonable attempts to facilitate coordination between the Permittees.

6.5. Monitoring.

6.5.1. Implementation. Each Permittee will monitor the effects of implementing Beneficial Management Activities on its Enrolled Property. Additional detail regarding monitoring is provided in Appendix 3 and 4 and each Site Plan Agreement.

6.5.2. Effectiveness. The Parties will monitor the effectiveness of implementation of the several Site Plan Agreements in the Covered Area. As specified in Appendix 4, the Parties will install and operate flow and temperature monitoring stations at appropriate locations in the Shasta River as described in the Adaptive Management Program in accordance with approved Site Plans, and will report resulting data to NMFS and

CDFW to determine, evaluate and enhance the impacts of implementation of Beneficial Management Activities.

6.5.3. Funding of Effectiveness Monitoring. Each Permittee shall contribute a total of $1,500 annually to effectiveness monitoring. Permittees shall provide such funding to SWCG by February 1 of each year of its ESP. Thereafter, SWCG will provide such contributions directly to parties designated by NMFS to undertake effectiveness monitoring.

6.6. Reporting.

6.6.1. Permittee. By March 1st of each year, a Permittee will prepare a report on its implementation of its Site Plan Agreement during a twelve-month period ending on the prior December 31 (i.e. January 1 through December 31). The Permittee will provide the report to other Parties. The report will include the following information:

A. Status of implementation of Routine Agricultural Activities and associated Avoidance and Minimization Measures;

B. Status of implementation of Beneficial Management Activities, including any proposed changes for a subsequent year; and

C. Monitoring results from its individual Site Plan Agreement.

6.6.2. SWCG. By March 1 of each year during the terms of this Template Safe Harbor Agreement, the SWCG will review all annual reports by Permittees and submit to NMFS and CFDW a consolidated annual report on the implementation of this Template Safe Harbor Agreement.

6.6.3. By May 1 of each year, NMFS, CDFW will review the consolidated annual report submitted by the SWCG and will work collaboratively with the SWCG and individual Permittees to address any comments or questions that arise during the agency's review.

6.6.4. NMFS. By June 30 of each year, NMFS will review reports provided by Permittees and SWCG and prepare a public Annual Implementation Report (AIR), documenting implementation of the Site Plans and actions taken towards achievement of Net Conservation Benefit.

6.6.5. Independent Consultant. The Parties will choose an independent consultant to report on effectiveness monitoring pursuant to Section 6.5.2. The consultant will provide the report to NMFS and CDFW as specified in Appendix 4.

6.7. Amendments.

6.7.1. Amendment or Modification of the ESP. Amendment or modification of the ESP is governed by the ESA, 50 C.F.R. §222.306 and NMFS' policies concerning safe harbor agreements effective when the modification or amendment is sought (currently 64 FR 32717).

6.7.2. Amendment of the Template Safe Harbor Agreement. Any Permittee, NMFS, or CDFW may propose an amendment to this Template Safe Harbor Agreement by providing Notice, which will include a statement of the proposed amendment, the reason for it, and its expected results. The parties will use their best efforts to respond to proposed amendment within sixty (60) calendar days of receipt of such Notice. A proposed amendment will become effective upon written approval of NMFS.

6.7.3. Site Plan Agreement. Permittees may amend their Site Plan Agreement upon agreement between the applicable Permittee and NMFS. Amendments to Site Plan Agreements shall become effective upon the written agreement of NMFS .

6.7.4. Change in Baseline Conditions. NMFS, CDFW, and the Permittee may amend the description of Baseline or Elevated Baseline Conditions for an Enrolled Property, if necessary for reasons beyond the control of the Permittee or because of unintended results of properly-implemented Beneficial Management Activities Permittee. Any Party may propose such an amendment as described in the Notice process in Section 8.

6.7.5. Other Listed Species. This Template Safe Harbor Agreement and Site Plan Agreements, may, upon agreement of all the Parties, be amended to include other ESA-listed species as Covered Species. Such amendment will contain appropriate revisions to this Template Safe Harbor Agreement and Site Plan Agreements, including but not limited to revisions to: (a) the description of Baseline, Elevated Baseline, and Return to Baseline; and (B) Beneficial Management Activities. If the newly included species is also listed under CESA, CDFW will review the amended documents for a Consistency Determination. A new ESP would be required if other ESA listed species are included as Covered Species under an amended Template Safe Harbor Agreement and Site Plan Agreement.

6.7.6. Minor Modification of the Agreement. Minor Modifications potentially include, but are not limited to the following: corrections of typographic, grammatical, and similar editing errors that do not change the intended meaning; correction of any maps or exhibits to correct errors in mapping; minor changes to survey, monitoring or reporting protocols; clarifications of vague or undefined language or phrases change in the mailing address or change in the trade name of Landowner. Any Party may propose minor modifications to this Template Safe Harbor Agreement by providing written notice to all other Parties. Such notice shall include a statement of the reason for the proposed modification and an analysis of its

environmental effects, including its effects on Management Activities and on listed species. The Parties shall use reasonable efforts to respond to proposed modifications within sixty (60) days of receipt of such notice. Proposed Minor Modifications shall become effective, and this Template Safe Harbor Agreement shall be deemed modified accordingly, immediately upon the written agreement of both the relevant Permittee and NMFS. Among other reasons, a Party may object to a proposed minor modification based on a reasonable belief that such modification would result in adverse effects on the environment that are new or significantly different from those analyzed in connection with the original Template Safe Harbor Agreement or additional take not analyzed in connection with the original Template Safe Harbor Agreement. If a Party objects to a proposed Minor Modification, the proposal is not approved as a Minor Modification but may be processed as an amendment in accordance with Section 6.7.1 of this Template Safe Harbor Agreement

6.8. Termination.

6.8.1. Permittee. A Permittee may withdraw from the Template Safe Harbor Agreement, terminate its own Site Plan Agreement and withdraw from its own ESP before the Expiration Date, pursuant to the following procedures, and in accordance with 50 C.F.R. 222.306(d).

A. Notice. The Permittee will provide Notice to NMFS and CDFW of its intent to withdraw from the Template Safe Harbor Agreement and its ESP and terminate its Site Plan Agreement. Such Notice will be on the schedule specified in the Site Plan Agreement, or at least sixty (60) calendar days prior to termination in the absence of such specification.

B. Regulatory Assurances during Return to Baseline. Notice must be timely for the Pemittee to avoid liability under the ESA Section 9 or CESA during the Return to Baseline as provided in each Site Plan Agreement.

6.8.2. NMFS. NMFS may terminate an ESP and related Site Plan Agreement with respect to a Permittee for the following reasons: 1) NMFS believes that the continuation of the activities in this Template Safe Harbor Agreement, the Permittee's Site Plan Agreement, or related ESP is likely to result in jeopardy to any species listed under the ESA, modify adversely or destroy designated critical habitat for such species, or result in the unauthorized take of ESA-listed species; NMFS may terminate for these reasons even if a Permittee has complied with the terms of this Template Safe Harbor Agreement, the Site Plan Agreement, or related ESP; 2) a Permittee failed to comply with this Template Safe Harbor

Agreement, its Site Plan Agreement, or related ESP, including but not limited to failing to implement the Beneficial Management Activities identified in the Site Plan Agreement, 3) NMFS believes that realization of the Net Conservation Benefit on an Enrolled Property is unlikely as a result of actions of a third party, or 4) other reason as provided for in applicable law or by the ESP.

A. Notice. NMFS will provide Notice of its intent to terminate an ESP and related Site Plan Agreement not less than sixty (60) calendar days in advance of such termination. Thereafter, the Permittee will have the opportunity to remedy the alleged circumstances prior to termination. Any dispute arising under this provision shall be resolved prior to the expiration of the 60-day notice period in accordance with Section 9 of this Template Safe Harbor Agreement.

B. Regulatory Assurances during Return to Baseline. As provided in each Site Plan Agreement, a Permittee will not incur liability under ESA Section 9 or CESA during the Return to Baseline so long as the Permittee is in compliance with this Template Safe Harbor Agreement, the Site Plan Agreement, and related ESP. [REVIEW AS OF 5/18]

7. Assurances.

7.1. Covered Species. An ESP will provide that, so long as the Permittee is complying with the terms of this Template Safe Harbor Agreement, Site Plan Agreement, and related ESP, a Permittee will not be liable for incidental take of Covered Species resulting from: Routine Agricultural Activities, Beneficial Management Activities, and Return to Baseline.

7.2. Exceptions. These assurances do not apply to take of Covered Species resulting from: (A) failure to timely and properly implement the Site Plan Agreement or ESP; or (B) activities which are not authorized by this Template Safe Harbor Agreement, the Site Plan Agreement, or related ESP; or (C) misrepresentation or falsifying information in a Site Plan Agreement. These assurances do not apply to any species that is not a Covered Species.

7.3. Delayed Permit Effectiveness. Edson Foulke and Parks Creek Ranch may be issued ESPs with delayed permit effective dates. In the event either Edson Foulke or Parks Creek Ranch do not implement the flow strategies contained in their respective Site Plan Agreements within three years after the issuance of their respective Permits, then those Permits may expire. Thereafter, NMFS and CDFW reserve the right to meet and confer with the other Permittees to determine if changes to Site Plan Agreements are needed to address the expiration of such Permits.

8. Notices. Any notice under this Template Safe Harbor Agreement, including a Site Plan Agreement, will be in written form, by electronic mail or similar method of delivery, as follows:

Notice Party/Email Address	Notice Party/Email Address
National Marine Fisheries Service: Jim Simondet, Jim.Simondet@noaa.gov	Hole in the Ground Ranch: Julie Kelley, JKelley@spi-ind.com
California Department of Fish and Wildlife: Curt Babcock,	Montague Irrigation District: Gary Black, gblack@sisqtel.net
Shasta Watershed Conservation Group: President (swcg2017@gmail.com), with a copy to Jim Lynch, Counsel, KL Gates LLP, jim.lynch@klgates.com	Nicolleti Ranch: Nicoletti Family, bsnicolett@yahoo.com
Belcampo - North Annex: James Rickert, jr@belcampo.com	Novy Ranch: Judy Novy Holmes, Judy@NovyRanches.com
Cardoza Ranch: Frank Cardoza, fcardoza@cot.net	Parks Creek Ranch: James Rickert, jr@belcampo.com
Edson Foulke: Tim Nielsen, tnielsen06@gmail.com	Rice Livestock: Brian Rice, Rice4@cot.net
Grenada Irrigation District: Lisa Mott, gidwater@gmail.com	Seldom Seen Ranch: Julie Kelley, JKelley@spi-ind.com
Hidden Valley Ranch: Jack Roggenbuck, jrhvr@me.com	Shasta Springs Ranch: Julie Kelley, JKelley@spi-ind.com

9. Dispute Resolution. Any dispute between a Permittee, NMFS, or CDFW arising under this Template Safe Harbor Agreement, Site Plan Agreement, or ESP, is subject to these procedures. Disputes between Permittees shall be addressed outside this Template Safe Harbor Agreement by the Permittees; *provided, however*, that a Permittee may request that NMFS or CDFW participate in a dispute resolution process with another Permittee if the dispute may impact a Permittee's ability to perform under its ESP.

9.1. Procedures.

9.1.1. Dispute Initiation Notice. A party claiming a dispute will give Notice of the dispute within seven days of becoming aware of the dispute. Such Notice will describe: (a) the matter(s) in dispute; (b) the identity of any

other party alleged to have not performed an obligation arising under this Template Safe Harbor Agreement; and (c) the specific relief sought. Collectively, the party initiating the procedure, the party complained against, and any other party which provides Notice of its intent to participate in these procedures, are "Disputing Parties."

9.1.2. Informal Meetings. Disputing Parties will hold at least one informal meeting to resolve the dispute, commencing within thirty (30) calendar days after the Dispute Initiation Notice, and concluding within sixty (60) calendar days of the Dispute Initiation Notice unless extended upon mutual agreement of the Disputing Parties.

9.1.3. Mediation. If the dispute is not resolved in the informal meetings, then the Disputing Parties may use a neutral mediator for a dispute; provided that a dispute whose resolution depends upon a third party will generally not be appropriate for mediation. The decision whether to pursue mediation, and if affirmative the identity and allocation of costs for the mediator, will be made within seventy five (75) calendar days after the Dispute Initiation Notice. Mediation will not occur if the Disputing Parties do not agree on use of a mediator, choice of mediator, and allocation of costs. The mediation process will be concluded not later than 120 days after the Dispute Initiation Notice. The above time periods may be shortened or lengthened upon mutual agreement of the Disputing Parties.

9.1.4. Dispute Resolution Notice. The Disputing Parties will provide Notice of the results of the Dispute Resolution Procedures. The Notice will: (a) restate the disputed matter, as initially described in the Dispute Initiation Notice; (b) describe the alternatives which the Disputing Parties considered for resolution; and (c) state whether resolution was achieved, in whole or part, and state the specific relief, including timeline, agreed to as part of the resolution. Each Disputing Party will promptly implement any agreed resolution of the dispute.

9.2. Reservation of Rights. Each party reserves the right, at any time without completing the dispute resolution procedures set forth in this section, to seek any remedy under applicable law.

10. Other Remedies. This Template Safe Harbor Agreement does not create a cause of action in contract for monetary damages or any other remedy for any alleged breach by any Party. This Template Safe Harbor Agreement does not create a cause of action in contract for monetary damages or other remedies for failure to perform an obligation under a Site Plan Agreement. Neither this Agreement nor a Site Plan Agreement create a cause of action by third parties for monetary damages or other legal or equitable remedies.

11. Representations.

11.1. Compliance with Legal Responsibilities. Each Party represents that it believes and expects that implementation of this Template Safe Harbor Agreement, Site Plan Agreement, and ESP satisfies the statutory, regulatory or other legal requirements for protection of Covered Species in the Covered Area.

11.2. Conformity with Applicable Laws. The Parties intend to conduct the activities set forth in this Template Safe Harbor Agreement, applicable Site Plan Agreement, and associated ESP in accordance with existing authorities and Applicable Laws governing the signatories.

12. Reservation of Authorities.

12.1. General. Nothing in this Template Safe Harbor Agreement is intended or will be construed to affect or limit the authority or obligation of any Party to comply with any judicial decision or order. Nothing in this Template Safe Harbor Agreement is intended or will be construed to affect any constitutional, statutory or regulatory authority of a Party, except as provided herein.

12.2. No Predecisional Commitment. Nothing in this Template Safe Harbor Agreement is intended or will be construed to be an irrevocable commitment of resources or a pre-decisional determination by a Party. Nothing in this Template Safe Harbor Agreement is intended or will be construed to modify the application of National Environmental Policy Act, California Environmental Quality Act, or other Applicable Law, to the environmental review of any program, plan, policy, or action (or project) under this Template Safe Harbor Agreement. Nothing in this Template Safe Harbor Agreement will be interpreted to limit the discretion under Applicable Law of NMFS or CDFW to alter any program, plan, policy or action of such Party in response to information and considerations developed during the environmental review process.

12.3. No Commitment regarding Federal or State Appropriations. Implementation of this Template Safe Harbor Agreement is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Template Safe Harbor Agreement will be construed by the Parties to require the obligation, appropriation, or expenditure of any funds from the U.S. or state treasuries. The Parties acknowledge that NMFS will not be required under this Template Safe Harbor Agreement to expend any Federal appropriated funds unless and until an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

12.4. No Waiver of Sovereign Immunity. Nothing in this Template Safe Harbor Agreement is intended or will be construed as a waiver of sovereign immunity by the United States or the State of California. This Template Safe Harbor Agreement does not oblige the United States to affirmatively support this

Template Safe Harbor Agreement regarding any state or local legislative, administrative, or judicial action before a state administrative agency or court.

12.5. No Argument, Admission, or Precedent. This Template Safe Harbor Agreement, Site Plan Agreement, or ESP will not be offered for or against a Party as argument, admission, or precedent regarding any issue of fact or law in any mediation, arbitration, litigation, or other administrative or legal proceeding, except that this Template Safe Harbor Agreement may be used in any future proceeding to interpret or enforce the terms of this Template Safe Harbor Agreement, consistent with Applicable Laws. This Template Safe Harbor Agreement may also be used by any Party in litigation by or against non-Parties to implement or defend the Template Safe Harbor Agreement.

12.6. No Non-Competitive Award. This Template Safe Harbor Agreement does not establish authority for the noncompetitive award to any non-governmental Party of any contract or other agreement.

13. Governing Law. A Party's performance of an obligation under this Template Safe Harbor Agreement will be governed by: (a) applicable provisions of this Template Safe Harbor Agreement; (b) Applicable Law for obligations of that type; and (c) the terms of any Site Plan Agreement or related ESP. Any reference in this Template Safe Harbor Agreement to an Applicable Law will be deemed to be a reference to such law in existence as of the date of the action in question.

14. Other Terms

14.1. No Third-Party Beneficiaries. This Template Safe Harbor Agreement, a Site Plan Agreement, or an ESP does not create any right or interest in the public, or any member thereof, as a third party beneficiary thereof, and will not authorize any third party to maintain a suit at law or equity pursuant to this Template Safe Harbor Agreement. The rights and obligations of the Parties with respect to third parties will remain as imposed under Applicable Law.

14.2. Elected Officials Not to Benefit. No elected official will be entitled to any share or part of this Template Safe Harbor Agreement or to any benefit that may arise from it.

14.3. No Joint Venture. Except as otherwise expressly set forth herein, nothing contained in this Template Safe Harbor Agreement is intended or will be construed to create an association, trust, partnership or joint venture, or impose any trust or partnership duty, obligation or liability on any Party, or create an agency relationship between or among the Parties or between any Party and any employee of another Party.

15. Successors and Assigns. As provided in 50 C.F.R. §222.305(a)(3), if a Permittee transfers an Enrolled Property, or a property interest therein, to another entity, the ESP may be

transferred to the proposed transferee. Upon transfer of the ESP under 50 C.F.R. §222.305(a)(3), the transferee will have the same rights and responsibilities with respect to the Enrolled Property as the original Permittee. A Permittee will provide NMFS and CDFW at least sixty (60) calendar days' advance written Notice of any such potential transfer.

16. Entire Agreement. This Template Safe Harbor Agreement, along with a Permittee's Site Plan Agreement and related ESP, contains the complete and exclusive agreement of the Parties with respect to the subject matter hereof, and supersedes all discussions, negotiations, representations, and commitments prior to the Effective Date, with respect to its subject matter.

16.1. Non-Severable Terms. The terms of this Template Safe Harbor Agreement are not separable one from the other. This Template Safe Harbor Agreement is made on the understanding that each term is in consideration and support of every other term, and that each term is a necessary part of this Template Safe Harbor Agreement.

16.2. Remedy for Severance. If a court of competent jurisdiction rules that any provision of this Template Safe Harbor Agreement, Site Plan Agreement, or ESP is invalid, then the remaining terms of the Template Safe Harbor Agreement, Site Plan Agreement or ESP shall remain in effect unless further terminated by the Permittee, NMFS, and CDFW.

17. Signing. Each Party's signatory represents that he or she has the authority to sign this Template Safe Harbor Agreement. This Template Safe Harbor Agreement may be executed in one or more counter-parts, each of which will be deemed to be an original copy of this Template Safe Harbor Agreement, and all of which, when taken together, will be deemed to constitute one and the same agreement.

IN WITNESS THEREOF, The Parties, through their authorized representatives, have caused this Safe Harbor Template Agreement to be signed (signatures provided on following pages).

Organizational Permittees:

_____ _____

California Department of Fish and Wildlife Date

By signing this Template Safe Harbor Agreement CDFW expresses its expectation that the Agreement along with a Permittee's Site Plan Agreement signed by NMFS, and the NMFS ESP, could meet the requirements of section 2089.22 of the California Fish and Game Code with respect to the particular property described in the Site Plan Agreement. However, CDFW will not make such determination until reviewing that Site Plan Agreement signed by NMFS and the NMFS ESP.

_____ _____

National Marine Fisheries Service Date

_____ _____

Shasta Watershed Conservation Group Date

Landowner Permittees:

_____ _____

Belcampo - North Annex Date

_____ _____

Cardoza Ranch Date

_____ _____

Edson Foulke Date

_____ _____

Grenada Irrigation District Date

_____ _____

Hidden Valley Ranch Date

_____ _____

Hole in the Ground Ranch Date

_____ _____

Montague Irrigation District Date

_____	_____
Nicoletti Ranch	Date

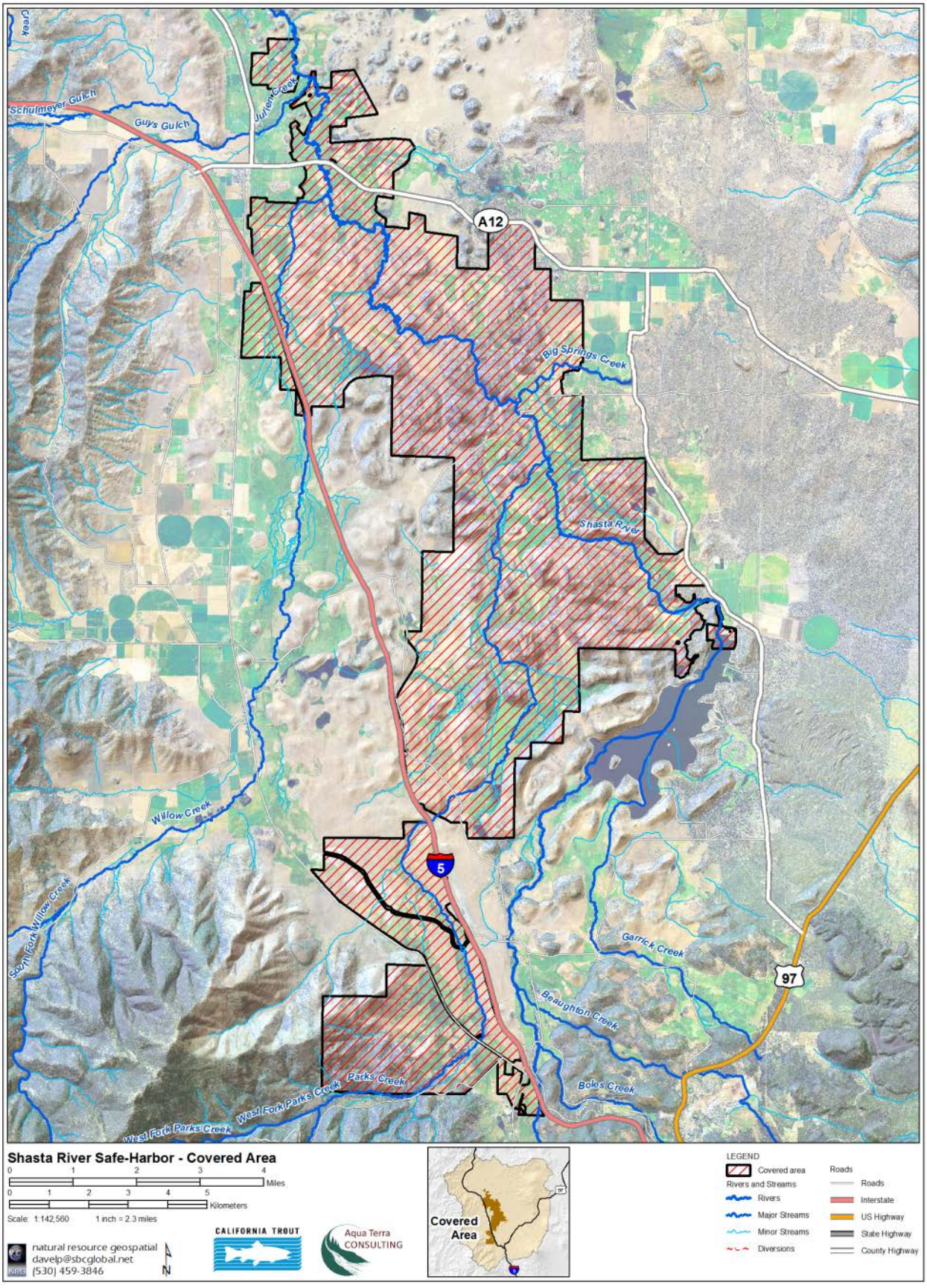
Landowner Permittees (cont'd):

_____	_____
Novy Ranch	Date
_____	_____
Parks Creek Ranch	Date
_____	_____
Rice Livestock	Date
_____	_____
Seldom Seen Ranch	Date
_____	_____
Shasta Springs Ranch	Date

APPENDICES

1. Figure depicting Covered Area
2. Covered Species, Biological Requirements and Habitat Conditions
3. Covered Activities and Avoidance and Minimization Measures
4. Adaptive Management Program

APPENDIX 1: Figure Depicting the Covered Area


Schulmeyer Gulch
Guys Gulch
Jurlens Creek
A12
Big Springs Creek
Shasta River
Willow Creek
South Fork Willow Creek
5
Garrick Creek
97
Beaughton Creek
Parks Creek
West Fork Parks Creek
Boles Creek
Shasta River Safe-Harbor - Covered Area
Miles
Kilometers
Scale: 1:142,560
1 inch = 2.3 miles
natural resource geospatial
davelp@sbcglobal.net
(530) 459-3846
CALIFORNIA TROUT
Aqua Terra CONSULTING
Covered Area
LEGEND
Covered area
Rivers and Streams
Rivers
Major Streams
Minor Streams
Diversions
Roads
Roads
Interstate
US Highway
State Highway
County Highway

APPENDIX 2: Covered Species, Biological Requirements and Habitat Conditions

Covered Species, Biological Requirements and Habitat Conditions
Shasta River Safe Harbor Agreement

1. Description of the Covered Area

Private landowners within the geographic scope of this Agreement, as shown in Figure 1, are eligible to enroll their properties in this Agreement. For purposes of this Agreement the area shown in Figure 1 is known as the Covered Area. With the exception of the Big Springs Ranch, which was acquired by the California Department of Fish and Wildlife in 2018, all of the enrolled properties are privately owned. The enrolled properties are adjacent to the Shasta River, Parks Creek or Big Springs Creek, and are primarily managed for agricultural production and rural residences. The enrolled properties contain habitat for the Southern Oregon/Northern California Coast (SONCC) coho salmon (Covered Species).

2. Covered Species

The Safe Harbor Agreement covers the federally threatened SONCC coho salmon (*Oncorhynchus kisutch).* NMFS listed the SONCC evolutionarily significant unit (ESU) of coho salmon as a threatened species in 1997 (62 FR 24588; May 6, 1997), and this status was reaffirmed in 2005 (70 FR 37160; June 28, 2005). The SONCC Coho Salmon Recovery Plan (NMFS 2014) identifies key stressors on coho salmon in the Shasta River and their designated critical habitat. Key stressors include seasonally impaired water quality and altered hydrologic function.

2.1. Covered Species Description

Coho salmon are an anadromous fish species that generally exhibits a relatively simple 3-year life cycle. Adults typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, and then die. Migration and spawning times vary between and within populations. Depending on river temperatures, eggs incubate in “redds” (gravel nests excavated by spawning females) for 1.5 to 4 months before hatching as “alevins” (a larval life stage dependent on food stored in a yolk sac). Once most of the yolk sac is absorbed, the 30 to 35 millimeter fish (then termed “fry”) begin emerging from the gravel in search of shallow stream margins for foraging and safety. Coho salmon fry typically transition to the juvenile stage by about mid-June when they are about 50 to 60 mm, and both stages are collectively referred to as “young of the year.” Juveniles develop vertical dark bands or “parr marks”, and begin partitioning available instream habitat through aggressive agonistic interactions with other juvenile fish. Juveniles rear in fresh water for up to 15 months, then migrate to the ocean as “smolts” in the spring. Coho salmon typically spend 2 growing seasons in the ocean before returning to their natal stream to spawn as 3 year-olds. This relatively rigid 3-year life cycle results in three distinct brood year classes. Some precocious males, called “jacks,” return to spawn after only 6 months at sea. (NMFS 2014).

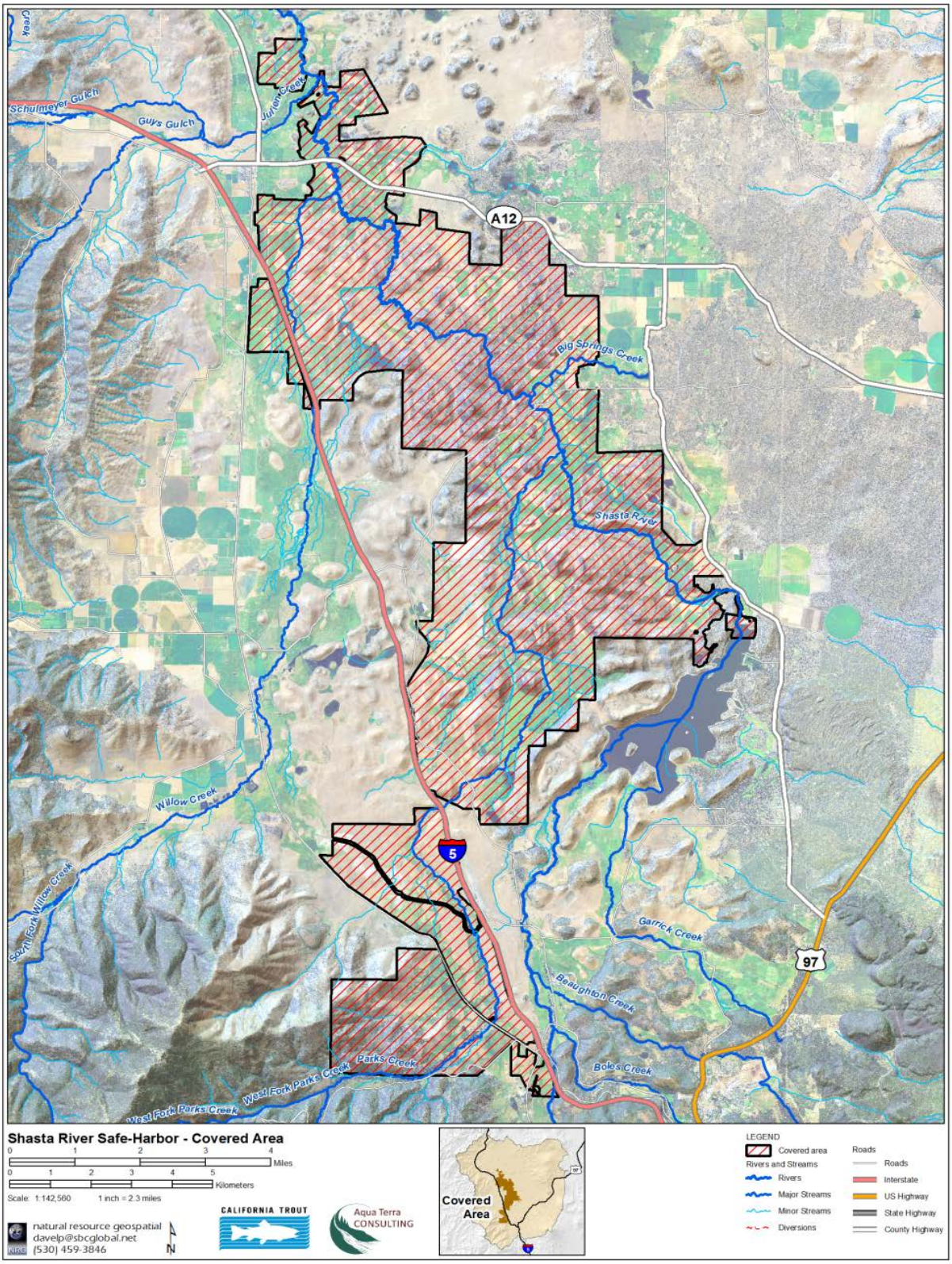


Figure 1. Map of the Covered Area for the Shasta Safe Harbor Agreement.

The basic habitat requirements of coho salmon freshwater life stages include (1) adequate availability of deep complex habitat (pools), (2) adequate quantities of water, (3) cool water temperatures, (4) unimpeded passage to spawning grounds (adults) and back to the ocean (smolts), (5) adequate quantities of clean spawning gravels, and (6) access to low velocity habitat (e.g., side channels, floodplains) during high flow events. As described in NMFS (2014), numerous other requirements exist (i.e., adequate quantities of food, dissolved oxygen, low turbidity, etc.) but in many respects these other needs are generally met when the basic freshwater habitat requirements listed above are suitable.

The diversity and complexity of physical and environmental conditions found within the Shasta River basin created unique life history strategies and diverse coho salmon habitat. Historical instream river conditions, fostered by unique cold spring complexes, created abundant summer rearing and off channel overwintering habitat that were favorable for production of coho salmon in the Shasta River basin. The current distribution of coho salmon spawners is concentrated in the mainstem Shasta River from river mile 32 to about river mile 36, Big Springs Creek, lower Parks Creek, and in the Shasta River Canyon (river mile 0 to 7). Juvenile rearing is also occurring in these same areas, and occasionally in lower Yreka Creek (Garwood 2012) and the upper Little Shasta River (Whelan 2006). Coho salmon have also been observed utilizing aquatic macrophyte habitat in the Big Springs Creek area that is both complex and productive. The current distribution is both a small fragment of the current Shasta River stream network and of the modeled Intrinsic Potential in the basin (Williams et al. 2006, 2008).

CDFW has conducted adult spawning surveys and fish counts at weirs since1934. Weir counts indicate that the minimum number of adult spawning coho salmon in the Shasta River have varied between 0 to 400 for most years, with a high of approximately 900 returning adults in 1978 (CDFW 2013b). These data may not account for the entire adult coho salmon brood year numbers, as weirs were sometimes removed due to high flows before all coho salmon spawners had entered the Shasta River. However, these brood year population estimates are low and have not trended upward over time.

Straying of hatchery fish is another important stressor on the SONCC coho salmon ESU, including in the Shasta River. The average annual percentage of hatchery coho salmon in the Shasta River from 2001 to 2010 was 23 percent, with a high of 73 percent in 2008 (CDFW 2013b; Ackerman et al. 2006). However, starting in 2010, all returning adult coho salmon to Iron Gate Hatchery that were not used as used as broodstock were returned back to the Klamath River where they would have the opportunity to spawn naturally in the upper Klamath River or nearby tributary streams. This management recommendation was included in the Hatchery and Genetics Management Plan (HGMP) for the coho salmon program at Iron Gate Hatchery (IGH) to reduce the immediate threat of demographic extinction for coho salmon populations in the Upper Klamath River and Shasta River (CDFW &, PacifiCorp 2014). Under the HGMP the IGH program will operate in support of the basin's coho salmon recovery efforts by conserving a full range of the existing genetic, phenotypic, behavioral, life history and ecological diversity of the run. The program includes conservation measures, genetic analysis, and rearing and release techniques that will improve fitness and reduce straying of hatchery fish to natural spawning areas. As a result of this change in management the number of hatchery strays into the Shasta River has increased since 2010 to comprise an average of 71% of the total adult return. The

number of natural origin adults returning between 2010 and 2014 has ranged between 8 and 62 fish, well below depensation. Therefore, the Shasta River coho salmon population is at high risk of extinction given the unstable and low population size and presumed negative population growth rate.

The Shasta River coho salmon population is a core, Functionally Independent population within the Interior Klamath River diversity stratum; historically having had a high likelihood of persisting in isolation over 100-year time scales, and with population dynamics or extinction risk over a 100-year time period that are not substantially altered by exchanges of individuals with other populations (Williams et al. 2006). NMFS has estimated that, in order to contribute to stratum and ESU viability, the Shasta River core population should have at least 4,700 spawners (NMFS 2014). Sufficient spawner densities are needed to maintain connectivity and diversity within the stratum and continue to represent critical components of the evolutionary legacy of the ESU. Besides its role in achieving demographic goals and objectives for recovery, as a core population, the Shasta River coho salmon population may serve as a source of spawner strays for nearby populations. At present, the capacity of the Shasta River coho salmon population to provide recruits to adjacent independent populations is limited due to its low spawner abundance. Conversely, recruits straying from the nearby Scott River and Upper Klamath River may enhance recovery of the Shasta River.

2.2. Covered Species Distribution

The current North American range of coho salmon extends from Point Hope, Alaska, south to streams in Santa Cruz County, California. Within this coastal area, NMFS designated seven ESUs of coho salmon, each with its own distinct geographic range. The coho salmon in the Shasta River belong to the SONCC coho salmon ESU, which includes 40 populations of coho salmon in coastal streams from the Elk River near Cape Blanco, Oregon, through and including the Mattole River near Punta Gorda, California. Spanning Oregon and California, SONCC coho salmon can be found in 13 counties: Coos, Douglas, Curry, Josephine, Jackson, Klamath, Del Norte, Siskiyou, Humboldt, Trinity, Mendocino, Lake, and Glen.

The Shasta River is tributary to the Klamath River and is one of the largest tributary sub-basins in the Upper Klamath River watershed. The current distribution of coho salmon spawners in the Shasta River watershed is concentrated in the Shasta River Canyon from its confluence with the Klamath River to about river mile (RM) 7, and in the Big Springs Complex, which consists of the mainstem Shasta River from RM 32 to about RM 36, Big Springs Creek, and lower Parks Creek (NMFS 2014). Juvenile rearing is also occurring in these same areas. This distribution is both a small fragment of the current Shasta River stream network and of the modeled IP habitat identified for SONCC coho salmon in the basin (NMFS 2014). Moreover, excessive water temperatures in the Shasta River Canyon typically preclude year-round juvenile coho salmon rearing. As such, the Big Springs Complex is recognized as the core habitat area for coho salmon in the Shasta River watershed (e.g., Willis et al., 2012).

The Shasta River coho salmon population evolved in areas of large spring complexes, which provided sustained sources of cold, clean, high quality water, and abundant areas for rearing during hot, dry summer months (NMFS 2014). Data indicate that water quality and hydrologic

function can be improved for the Shasta River coho salmon population. According to NMFS (2014), the most vital habitat in the Shasta River basin are its cold springs, which create cold water refugia for juvenile coho salmon, decrease overall water temperatures throughout the basin, and allow for successful summer rearing of individuals in natal and non-natal creeks and mainstem areas. Impaired water quality, altered hydrologic function, impaired mainstem function, increased disease/predation/ competition, lack of floodplain and channel structure, degraded riparian forest conditions, altered sediment supply, migration barriers, and adverse hatchery-related effects are also recognized as factors limiting the Shasta River coho salmon population (NMFS 2014).

2.3. Threats to Covered Species

NMFS listed the SONCC ESU of coho salmon as a threatened species in 1997 (62 FR 24588; May 6, 1997), and this status was reaffirmed in 2005 (70 FR 37160; June 28, 2005). The decision to list the SONCC coho salmon ESU was largely based on information regarding decreased abundance, reduced distribution, and degraded habitat. There are far fewer streams and rivers supporting coho salmon in this ESU now compared to historical conditions, and numerous basin-specific extirpations of coho salmon have been documented (Brown et al. 1994, CDFG 2004a, Good et al. 2005, Gustafson et al. 2007, NMFS 2014). At the time of listing, the major factors in the decline of the species were thought to originate from long-standing, human induced actions (e.g., habitat degradation, harvest, water diversions, and artificial propagation), combined with natural environmental variability (62 FR 24588, May 6, 1997). The most recent status review concluded the ESU remains threatened (NMFS 2011). Monitoring indicates that abundance of coho salmon decreased for many populations in the ESU since the last status review. Population trends are downward. Additionally, a majority of independent populations are well below low-risk abundance targets, and many may also be below the high risk depensation thresholds established by Williams et al. (2008). None of the seven diversity strata appear to support a single viable population. However, all of the diversity strata are occupied by coho salmon.

In August, 2002 the California Fish and Game Commission issued a finding that coho salmon warranted listing under the California Endangered Species Act (CESA) as a threatened species from the Oregon border south to Punta Gorda and as an endangered species from Punta Gorda south to San Francisco including the Bay.

2.4. Importance of Private Lands to Covered Species

Up to 53% of the Covered Species habitat is within private land holdings across the ESU geographic area in Oregon and California. Thus, private lands are important to the survival and recovery of the Covered Species.

The Covered Area includes the Shasta River from north of Highway A-12 upstream to Dwinnell Dam, including Big Springs Creek and lower Parks Creek (Figure 1). This area of the watershed is widely recognized as the core area for the Shasta River coho salmon population and is known to support coho salmon migration, spawning, and rearing. During warm summer months, juvenile coho salmon have been shown to migrate several miles to rear in areas influenced by

cold spring inputs (Adams 2013; Chesney et al. 2010). All of the stream reaches that are currently or may potentially be utilized by coho salmon within this area occur on privately owned land in agricultural production. There are currently 11 individuals, corporations, or entities that are participating in the Agreement and that collectively own approximately 30,000 acres adjacent to streams within the area. These landowners have formed the SWCG and are committed to benefitting salmonids, particularly coho salmon, by taking actions to enhance and expand habitat for coho salmon.

Aquatic species can not only benefit from improved instream habitat, but also by activities on lands adjacent to streams and within the watershed that subsequently affect water quality and habitat. A major step in the recovery and conservation of the SONCC coho salmon ESU is to encourage their presence and management of their habitat on private lands. This Agreement sets a goal of protecting and enhancing aquatic and terrestrial (riparian) habitat through implementation of beneficial management activities including barrier removals, instream flow strategies, and physical habitat enhancements within the area of properties eligible to enroll under this Agreement (see Section 5 of this Agreement). By including the enrolled properties in this Agreement, the SONCC ESU coho salmon are much more likely to reestablish viable population(s) and recolonize currently unoccupied reaches. There is a reasonable likelihood that coho salmon may subsequently occupy any or all of the properties enrolled under this Agreement.

3. Habitat Conditions in the Covered Area

This Agreement and associated Site Plan Agreements identify habitat conditions in the Covered Area that can be influenced or controlled by the Participants through land and/or water management actions on their enrolled properties. The goal of the Agreement is to improve habitat conditions for the survival and productivity of coho salmon in the upper Shasta River. Habitat characteristics presented here are focused on those that are limiting to coho salmon production in the Covered Area. These include adult migration and spawning, spring juvenile redistribution and outmigration, summer rearing, and juvenile over-wintering. The following discussion provides an overview of the conditions and limiting factors in the Shasta River in the Covered Area.

The focus of this Section of the Agreement and associated Site Plans is to identify those habitat conditions that can be influenced by the Participants and that are responsive to land and water management actions. Habitat characteristics and the suite of voluntary actions needed to reduce stressors are described below by river reach and are based on the life history requirements of the Covered Species. The Covered Species freshwater life history stages include adult migration and spawning, spring juvenile redistribution and outmigration, summer rearing, and juvenile over-wintering.

While the current status of the Shasta River population includes low population numbers and limited distribution throughout the basin, NMFS anticipates that implementation of recovery actions, including those proposed by the SWCG, will increase the abundance and distribution of coho salmon. As such, the habitat needs of coho salmon described within this section take into account the anticipated increase in numbers of individuals exposed to the action area over the

term of the Agreement. It should be noted that the availability of instream flow, water quality and habitat data varies considerably between reaches. Therefore, the level of detail describing the current status of these parameters within each reach also varies accordingly. Monitoring is required under this Agreement and is an important component that will further the understanding of current instream flow and water quality conditions in the Covered Area. Monitoring will be used to help assess the effectiveness of the voluntary land and water management and habitat restoration actions that are expected to benefit coho salmon populations over the term of the Agreement.

The Covered Area (Figure 1) includes about 20 miles of the Shasta River, the lower 1.6 miles of Big Springs Creek, and the lower 14 miles of Parks Creek. The TAC has identified six different reaches within the Covered Area for which baseline conditions have been qualitatively described. The reaches include the Upper Shasta River from Dwinnell Dam downstream to the confluence of Parks Creek (RM 40.6 to 35), the Mid-Shasta River from the confluence of Parks Creek downstream to the northern boundary of the Covered Area (RM 35 to 20), Big Springs Creek from the confluence with the Shasta River upstream to the water wheel crossing (RM 1.6 to 0), Upper Parks Creek (RM 14.5 to 8), Mid-Parks Creek (RM 8 to 2), and Lower Parks Creek (RM 2 to 0) as shown in Figure 2.

3.1. Reach 1 - Upper Shasta River - Parks Creek Confluence to Dwinnell Dam (RM 35 to RM 41)

Streamflow in the Upper Shasta River is primarily controlled through releases from Dwinnell Reservoir, which is owned and operated by the Montague Water Conservation District (MWCD). Dwinnell Reservoir was constructed on the Upper Shasta River in 1928 with the purpose of storing water for irrigation use during the growing season. MWCD holds appropriative water right permits (Permit Numbers 2452 and 2453) which give MWCD the right to divert and store a total of 49,000 acre-feet of water from the upper Shasta River (35,000 acre-feet) and Parks Creek (14,000 acre-feet) annually. The season of diversion under both of these permits begins on October 1 and ends on June 15, annually.

There are several ways in which MWCD can release water to the Upper Shasta River downstream of Dwinnell Dam. These include releases of irrigation water to meet prior water right holders downstream, short term voluntary release of water and participation in water lease agreements to improve instream conditions for salmonids, and release of interim environmental water as agreed to under a Settlement Agreement with the Klamath River Keeper and Karuk Tribe (*Klamath Riverkeeper and Karuk Tribe v. Montague Water Conservation District* Case No. 12-cv-01330 MCE-CMK (E.D. Cal.)).

MWCD has completed the permitting process with the U.S. Army Corps of Engineers to implement a Conservation and Habitat Restoration and Enhancement Project (CHERP). The CHERP will supersede the Settlement Agreement and includes development of a long term water conservation and flow enhancement program to improve conditions for coho salmon downstream of Dwinnell Dam. Under the CHERP, MWCD proposes to increase instream environmental releases by an average of 4,400 acre-feet below Dwinnell Dam as a conservation measure to

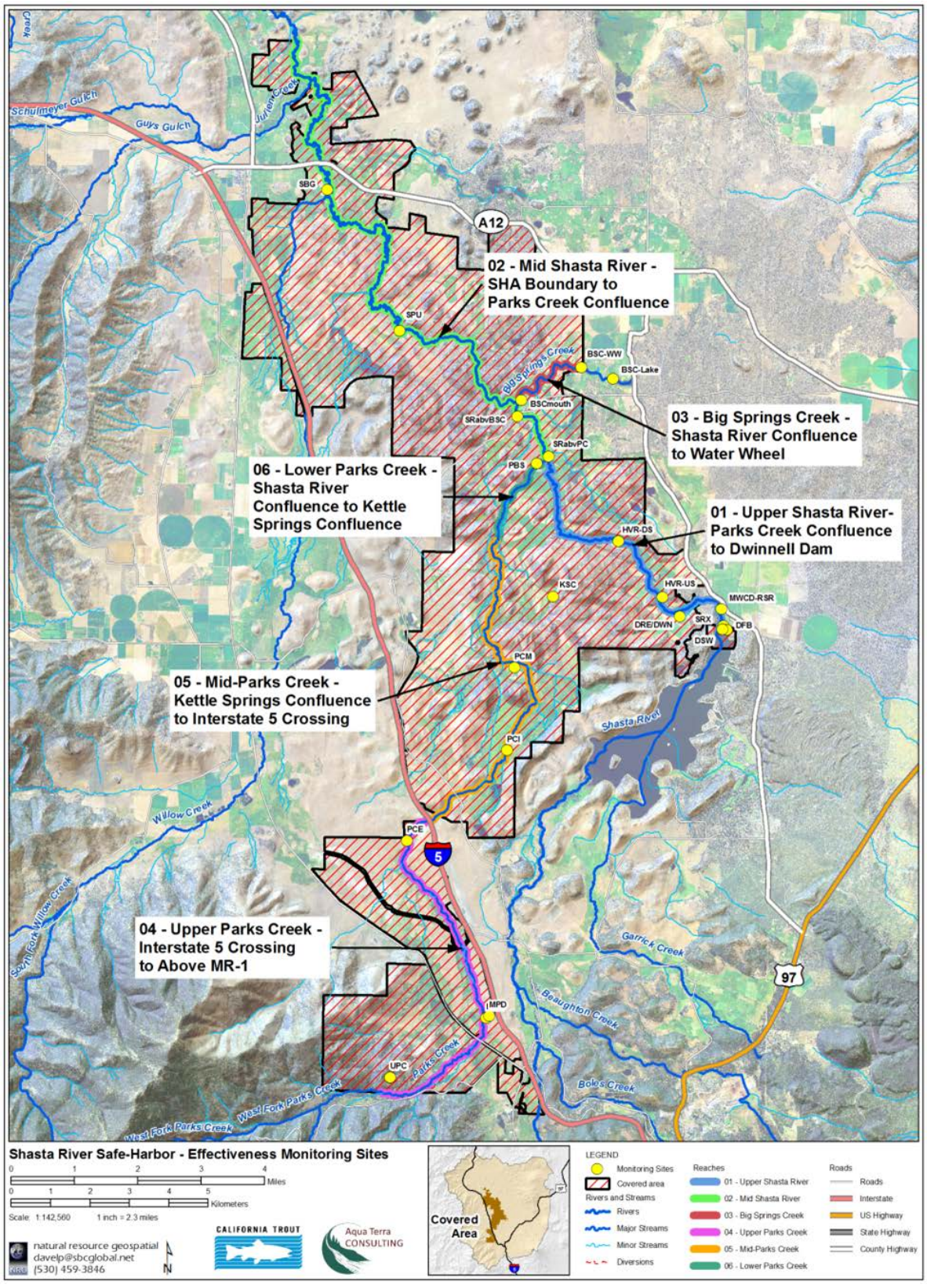


Figure 2. Shasta Safe Harbor Agreement Covered Area and River Reaches.

improve conditions for coho salmon using water conserved through lining of up to 8.4 miles of its main irrigation canal. The conserved water would be used to support fisheries habitat enhancements through a combination of (a) releases of stored water from Dwinnell Reservoir to the upper Shasta River, (b) bypassing additional flows at its Parks Creek Diversion, and (c) augmenting flows in the upper Shasta River through groundwater releases, and (d) potential water exchanges with downstream diverters. MWCD also proposes to implement other infrastructure improvements to support fisheries enhancement and recovery within the upper Shasta River and lower Parks Creek. These improvements include the enlargement of its Cross Canal that delivers released flow from Dwinnell Reservoir to the Shasta River and construction of wetland and cold water refugia habitat immediately downstream of Dwinnell Dam.

A substantial amount of water stored in Lake Shastina (~50%) is lost to evaporation and leakage (Vignola and Deas 2005). Although many of the springs in this reach of the river are believed to be recharged from glaciers and seasonal snow pack on the north slope of Mt. Shasta (Nichols et al., 2010), for some springs there may also be a correlation between reservoir levels and spring flow (Davids Engineering 2011). There are also some small seeps from leakage at the base of Dwinnell Dam that contribute between 0.2 and 2.0 cfs of cold water. The volume of these seeps is related to reservoir storage volume they contribute directly to the Upper Shasta River near the spillway. The volume of these seeps is reported by the California Data Exchange Center (CDEC) via gage Dwinnell Dam Seepage Weir (DSW).

MWCD delivers 3,382 acre-feet of water to prior right holders during the irrigation season between March 1 and November 1of each year. Up to 1,984 acre-feet of these prior right volumes of water are delivered through the Upper Shasta River when requested by individual prior right holders, while the remainder of the prior rights is delivered via MWCD's main canal. The prior rights releases to the Shasta River generally occur between April and September and release volumes are generally about 8.5 cfs and may range between 2 to 10 cfs. Prior right releases are reported on CDEC via gage Shasta River Cross Canal Weir at Dwinnell Dam (SRX).

In 2012 the Klamath River Keeper and the Karuk Tribe filed suit against the MWCD alleging that operation of the MWCD's facilities resulted in violation of the ESA and were a breach of the public trust doctrine. In December of 2013 MWCD entered into a Settlement Agreement with the Klamath River Keeper and the Karuk Tribe [*Klamath Riverkeeper and Karuk Tribe v. Montague Water Conservation District* Case No. 12-cv-01330 MCE-CMK (E.D. Cal.); herein referred to as the Settlement Agreement, December 19, 2013]. Under the Settlement Agreement MWCD agreed to increase releases downstream of Dwinnell Dam during an interim period which ended sixty days after the U.S. Army Corps of Engineers (Corps) issues MWCD a Clean Water Act Section 404 permit for MWCD's Conservation and Habitat Enhancement and Restoration Project (CHERP) and the permit includes the results of consultation between the Corps and the NMFS under Section 7 of the ESA. During the interim period that amount of environmental water released annually is based on several factors related to water availability. In summary, MWCD agreed to release an additional 1,126 acre-feet of water between October 1 and April 1 and a total annual release ranging from 2,250 acre-feet to 3,000 acre-feet or more depending on the amount of water stored in Lake Shastina on April 1. During this interim period, total instream releases have typically included a base flow of about 2 to 3 cfs in the fall and winter, with an increase in flow during the spring to between 15 to 25 cfs. Releases in late

spring and summer are typically comprised of about 9 cfs which includes release of 8 cfs to meet prior rights deliveries and 1.0 cfs of interim environmental water to help maintain flow connectivity when prior rights are not released. Diversion of prior rights deliveries downstream of Dwinnell Dam during the irrigation season reduces the amount of flow in the lower portion of this reach. However, flow contributions from irrigation seepage and from both discrete and diffuse spring sources increase flows above those base flow levels released from Dwinnell Dam during the summer. In the fall and winter seasons these spring flow accretions increase base flows in the lower portion of this reach to about 10 cfs.

ON March 8, 2018, the Corps determined that MWCD's CHERP qualified for authorization under Department of the Army Nationwide Permit 27 for *Aquatic Habitat Restoration, Enhancement and Establishment Activities*, 82 Fed. Reg. 1860, January 6, 2017. On September 28, 2017, NMFS issued a Biological Opinion and Essential Fish Habitat consultation to the Corps under Section 7(a)(2) of the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act for MWCD's CHERP (NMFS 2017). Under CHERP, MWCD proposed to change their operations for delivery of water to the Upper Shasta River below Dwinnell Dam which are described as CHERP flows. This includes the use of the Flying L groundwater pumps to provide a source of cold water for fish immediately downstream of Dwinnell Dam. The volume of water conserved through the lining of MWCD's main canal provides a source of water to implement CHERP flow releases. When conserved water becomes available MWCD will begin to release CHERP flows. The volume of releases will vary depending on the water year type which will be determined during the spring of each year. MWCD proposes to make the year type determination on, or around, March 1st and then updated on April 1st and again on May 1st. The criteria for year type determination are based on reservoir storage and snowpack, but vary between months. A process of examining changing year type within a year (from March 1 to May 1) is included to accommodate the potential changes in spring time conditions that may lead to more or less water available for the upcoming period. The method proposed to determine the water year types were developed by Watercourse Engineering, Inc. (2016). There will be five water year type designations and release strategies ranging from very dry (2,662 acre feet), dry (3,541 acre-feet), normal (4,437 acre-feet), wet (6,236 acre-feet), and very wet (8,152 acre-feet). MWCD also is obligated to release 1,984 Acre-Feet of water to landowners downstream who had water rights to the Shasta River prior to the construction of Dwinnell Dam. These releases are commonly referred to as "prior rights" releases and are delivered by MWCD in the Shasta River to these landowners when requested during the irrigation season (April 1st to October 1st). These releases are typically delivered between mid-April and mid-August but can vary depending on hydrologic conditions and the needs of the water right owners. Therefore, the total water releases downstream of Dwinnell Dam include prior rights releases, MWCD customer releases, and the proposed environmental water releases under CHERP.

However, lining of MWCD main canal may take up to five years to complete and CHERP flows will not occur until this water conservation project is complete. Prior to completion of the canal lining, MWCD will implement an interim flow schedule with conservation measures to improve water quality and habitat conditions for aquatic resources. As facilities are upgraded, additional volumes of water will be delivered with the proposed CHERP flows fully implemented at the end of the five-year Corps permit in about 2023. The interim flow plan includes ongoing flow

releases that are consistent with the December, 2013, Settlement Agreement between MWCD, Klamath River Keeper, and the Karuk Tribe, along with two additional conservation measures that are intended to benefit coho salmon. MWCD proposes to release a total volume of 2,662 acre-feet in years when storage is less than 18,000 acre-feet on April 1 (consistent with a Very Dry Water Year type). This is a net increase of 412 acre-feet above the current baseline of Settlement Flow releases. Under Settlement Agreement flows, MWCD's summer environmental flow releases are constrained by the temperature of water stored in Dwinnell Reservoir. Under the interim flow plan, MWCD proposes to utilize discharges from its Flying L pumps in consultation with NMFS to improve the water temperature of flow releases consistent with proposed CHERP and existing MWCD irrigation water management operations for all water

The condition of riparian vegetation Reach 1 varies. Approximately 73 percent of the reach is dominated by woody riparian vegetation, while approximately 21 percent of the reach is lacking riparian vegetation (CDFW 2018). Six percent of the reach supports herbaceous aquatic and emergent vegetation. The Upper Shasta Reach contains the best quality and most extensive woody riparian vegetation in the entire Upper Shasta/Parks Creek watershed. Stands of water birch (*Betula occidentalis*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), and occasional white alder (*Alnus rhombifolia*) make up the bulk of the 36.5 acres of woody riparian vegetation identified in this reach, but other broadleaf species are expected to be present. Conifers, including western juniper (*Juniperus occidentalis*) and Ponderosa pine (*Pinus ponderosa*) extend into the riparian community in the first mile downstream from Dwinnell Dam. In some locations the woody riparian vegetation is fairly healthy and provides a source of shade, cover and bank stability to the stream channel. The width of the woody riparian corridor exceeds 150 feet in some locations. However, there are still many locations where the riparian vegetation is non-existent, sparse or dominated by old age stands lacking recent recruitment of new willow and cottonwood saplings necessary to maintain a functional riparian corridor into the future and recruitment of water birch was observed in several locations in this reach. This reach also supports short segments of herbaceous aquatic and emergent vegetation typically indicative of spring fed streams. Herbaceous vegetation also provides habitat complexity and shading while supporting healthy aquatic food webs. Herbaceous vegetation dominates only six percent of the lower portion of the reach. It is expected that the herbaceous species present are similar to herbaceous vegetation in Big Springs Creek and other spring-fed aquatic habitats in the watershed.

In a review of the effects of water temperature on coho salmon, Stenhouse et al. (2012) found that water temperatures exceeding 20.3 °C have detrimental effects to rearing coho salmon. In the Shasta River Chesney et al. (2010) found that juvenile coho salmon avoid habitats when water temperatures begin to approach 18 °C to 20 °C and will migrate to cold water refugia habitats often associated with cold water spring sources. Water temperatures commonly exceed 20 °C throughout the majority of this reach during the late spring and summer. Over-summering habitat within this reach is currently limited to areas of cold water created and maintained by spring flow or areas where hyporheic flow enters the channel. Diversion of cold water sources for irrigation purposes reduces the amount of cold water instream that would otherwise be available to improve habitat conditions for juvenile coho salmon. There are several beaver dams within the lower portions of this reach and their number have increased in recent years. Beaver dams create favorable habitat conditions for rearing coho salmon by providing slow water

habitats with abundant woody cover. However, beaver dams may impede upstream migration of adults depending on the amount of flow available during the spawning migration season.

The following information summarizes limiting factors for each life stage of coho salmon within Reach 1 and includes recommended management actions:

- **Adult Migration and Spawning**. The upstream portion of Reach 1 lacks suitable substrate for spawning (i.e., gravel and cobble). Substrate quality is poor proximal to Dwinnell Dam, and improves in the lower extent of the reach. Adult coho salmon spawning has been documented in the lower mile of this reach downstream of existing beaver dams at about river mile 36. Under the Settlement Agreement, the Parties agreed to winter releases of between 2 and 3 cfs of streamflow in the Upper Shasta River beginning in October of each year over the term of the Settlement Agreement. At present, the interim flow releases may not provide sufficient depth and velocity in the upper extent of the reach to allow adult coho salmon migration and spawning (mid-October through early January). Instream flows of 10 cfs in the lower extent of this reach are expected to provide adequate conditions for adult coho spawning and migration (McBain & Trush 2013). Beavers are known to colonize and persist in the lower and mid portions of the reach. While beaver dams are known to create high quality summer rearing habitat, the dams may impede adult upstream migrations at lower streamflows.

  Recommended Habitat Enhancement Actions: Increase the amount and extent of spawning gravel in this reach; provide adult passage flows during the migration period; develop and implement a beaver dam management plan to reduce migration barriers; and, implement channel maintenance flows to encourage sediment transport and aid recruitment of riparian vegetation.

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing**. Habitat conditions in Reach 1 are generally suitable for coho salmon rearing through spring of each year. With improved water quality and water quantity conditions, fitness of juvenile coho salmon could potentially be high in this reach due to the large abundance of invertebrate food sources available to fish (Lusardi pers. Comm. 2015). However, once water temperatures begin to approach 20 °C juvenile coho salmon exhibit avoidance behavior triggering movement towards cold water habitats. Channel characteristics where suitable conditions are typically found include complex pools, backwaters, alcoves, and sloughs, associated with cold water springs or hyporheic flow contributions along the channel. Reach 1 contains a number of discrete cold water sources in the form of springs, especially between RMs 56 and 61, as well as diffuse cold water sources from in-channel groundwater accretions. During late spring and summer, low flows may reduce the fitness and survival of juvenile coho salmon by reducing the size of refugial areas and impeding the connectivity between refugial areas. Current diversions from cold water sources limit the potential benefits these habitats provide to coho salmon.

As mentioned above, riparian habitat conditions in Reach 1 vary and are lacking in some areas limiting instream shading and habitat complexity. In areas that lack healthy riparian vegetation, instream cover and habitat diversity is diminished. Open water areas lacking

riparian vegetation are often interspersed between dense riparian vegetation, offering opportunities for restoration and connecting existing high quality habitat patches.

Under the Settlement Agreement and interim flows , springtime flow releases from Dwinnell Dam have been increased. Increased springtime flow releases will improve conditions for juvenile salmonids by improving passage for both the redistribution of juvenile coho salmon and outmigration of smolts. Preliminary observations indicate that smolt (age 1+) outmigration survival improved as a result of these increased spring flows (CDFW 2015). Fry and parr both were likely provided improved conditions for movement such that they were more likely to find cold water refugial areas, although this has not been quantified.

Recommended Habitat Enhancement Actions: Increase the extent, reliability, and connectivity of existing cool water refugia areas in this reach; install and maintain riparian fencing and manage riparian zones to encourage development of mature riparian vegetation communities; increase channel roughness and large wood through riparian planting and placement of in-channel LWD to improve rearing habitat where habitat diversity is currently lacking; and, improve the quality and abundance of preferred habitats for rearing coho salmon through creation of alcoves, side-channels, oxbows and off channel ponds in areas where cold water is present.

- **Juvenile Over-Wintering**. Preferred coho salmon over-wintering habitat features such as backwaters, alcoves, side-channels, oxbows, and other secondary channel features providing refuge from displacement by high-flow events, and are absent from segments of Reach 1. Moreover, channel roughness provided by riparian vegetation and associated LWD exists in only portions of the reach. While lack of such features is typically thought to present a limiting factor for juvenile winter survival, the key over-wintering habitat attribute of such features is the velocity refuge they provide from high winter flows. Within the Upper Shasta River reach, however, the regulated hydrology associated with operation of Dwinnell Dam, as well as the presence of beaver dams, appears to provide the low velocity conditions that are generally associated with high winter survival. Moreover, spring discharges in the Upper Shasta River are known for their relatively constant water temperatures of 12-14°C. While spring discharges help to reduce Shasta River temperatures in the summer, they also help to raise water temperatures during the winter to levels more suitable for coho salmon. Adams (2013) attributed the higher winter survival of juvenile coho salmon within this reach to stable base flows and favorable thermal conditions.

  Recommended Habitat Enhancement Actions: Increase channel roughness and habitat complexity through riparian planting and placement of in-channel LWD; encourage development of beaver dam habitat and modify beaver dams to improve fish passage conditions and reduce impacts to ranch management when necessary; create off channel habitats to provide rearing coho salmon areas to seek refuge during high flow events. The types of off-channel habitats that may be considered include side channels, alcoves, oxbows, or secondary high flow channels within restored flood plains.

3.2. Reach 2 - Mid Shasta River – Highway A-12 to Parks Creek Confluence (RM 27 to RM 35)

This reach includes the confluence of Big Springs Creek about 1.3 miles downstream from the confluence of Parks Creek. Upstream of the confluence of Big Springs Creek, the Shasta River channel has an alluvial gravel/cobble bar morphology with typical riffle- run-pool habitat types dispersed throughout the reach. Coho salmon spawning habitat is abundant throughout most of the reach. There is a small unnamed spring that contributes about 3.0 cfs of cold water to the channel along the right bank a short distance downstream of the Parks Creek confluence near where Hole in the Ground Creek enters the river. The Hole-in-the-Ground Creek originates at Hole-in-the Ground Springs and the creek flows for about 2.3 miles in a northwesterly direction where it enters the Shasta River downstream of the confluence with Parks Creek. In 2008, Jeffres et al. (2009) measured stream flows in Hole in the Ground Creek and found the average flow to be 4.83 cfs during the irrigation season (April 1 to September 30) and 6.22 cfs in the non-irrigation season. There is an adjudicated water right of 1.5 cfs on Hole in the Ground Creek that is currently held by the California Department of Fish and Wildlife. The entire length of Hole in the Ground Creek flows through agricultural pastures that lack mature riparian vegetation and therefore water temperatures in the channel tend to exceed levels suitable for coho salmon.

Downstream of the Big Springs Creek confluence channel widths and depths increase substantially due to the large flow contributions entering from Big Springs Creek. The channel is still characterized by alluvial features with several large pools, short riffles and long run habitat types which persist for about another three miles until about the Grenada Irrigation District (GID) pump station. Some LWD is present periodically along the channel margins that provide cover and habitat diversity. Progressing further downstream, the river gradually transitions away from alluvial bar features and begins to form a relatively stable low gradient, highly sinuous rectangular shaped channel. The majority of the floodplain in this section has been reclaimed for agricultural purposes, primarily for cattle grazing and pasture management. During high flows, these areas are still accessible to anadromous salmonids. Little is currently known about the extent to which the floodplain habitats are used by over wintering salmonids during periods of higher flow, however, evidence of historic oxbows and cut off channels appear common and can be seen in satellite photos.

Woody riparian vegetation occurs along approximately 20 percent of this reach with most occurring in the vicinity of the GID diversion and intermittently downstream. Immediately downstream of the Big Springs Creek confluence, submergent and emergent herbaceous vegetation dominates portions of the channel, and wetland vegetation often extends beyond the banks. Herbaceous aquatic and emergent riparian vegetation dominates approximately 18.5 percent of this reach. Species assemblages include submergent pondweeds (*Potamogeton* spp.) and elodea (*Elodea canadensis*), floating macrophytes including *Azolla* sp.and *Lemna* sp., and emergent wetland plants including tules (*Schoenoplectus acutus*) and cattails (*Typha latifolia*). The aquatic and emergent species grow rapidly throughout the channel each spring and summer and then senesce in the fall after the first freeze. The aquatic vegetation provides a source of abundant cover and shade for coho salmon, increases velocity diversity across the channel and provides a rich substrate for invertebrate food

production. Approximately 61.5 percent of the reach is dominated by open water and is lacking significant stands of riparian vegetation. Open water becomes more common in the downstream portion of the reach.

Groundwater derived streamflow from Big Springs Creek provides voluminous and stable baseflows to the valley portion of the Shasta River while Parks Creek regularly provides larger winter and spring runoff flows (Nichols et al. 2010). There are about five points of diversion within this reach with adjudicated and riparian water rights totaling just over 69 cfs during the irrigation season. During the summer, water temperatures commonly exceed 20 °C and increase in a downstream direction. Even though much of this reach is highly productive and may be capable of supporting rearing coho salmon during much of the summer, coho salmon typically avoid these habitats once water temperatures approach 20°C. Coho salmon likely spawn in the upper sections of the reach and juvenile coho salmon are known to use available habitats in this reach during the spring, fall and winter when water temperatures are suitable (Chesney et al. 2010; Adams 2013; CDFW 2016).

The following information summarizes limiting factors for freshwater life stages of coho salmon within Reach 2 and includes recommended management actions:

- **Adult Migration and Spawning**. In addition to flows from the Upper Shasta River, the Mid Shasta River Reach receives significant, stable flow contributions from Big Springs Creek as well as more variable inflows from Parks Creek. Instream flows in this reach when adult coho salmon are migrating and spawning (mid-October through early January) are generally thought to be adequate after the end of the irrigation (diversion) season (October 1). As described by Nichols et al. (2010), channel gradients of the Shasta River downstream of Big Springs Creek are less than 1% as the river meanders through the central portions of the Shasta River Valley. This portion of the river exhibits channel morphologies typical of spring-fed rivers that derive the majority of streamflow from groundwater sources. Such rivers exhibit homogenous channel morphologies absent of channel bars or other bedforms typical of runoff-dominated rivers (Nichols et al., 2010). While adult coho salmon are known to spawn within the upper portion of this reach (from RM 33 to RM 35) where suitable substrates are present (i.e., vicinity of Parks Creek and Big Springs Creek confluences), the lower portion of this reach (RM 27 to RM 32) generally lacks the substrates size classes (gravel, small cobble) and habitat types (e.g., riffles, pool tail-outs, point bars) that typically constitute suitable spawning habitat. There is an existing flashboard dam in the lower portion of the reach that has the potential to impede adult migration during diversion season; however, the flashboard dam is removed prior to the presence of returning adult coho salmon. Hydraulic passage conditions at the flashboard dam require further assessment to determine potential effects to upstream migration for both juvenile and adult salmonids.

  Recommended Habitat Enhancement Actions: Where appropriate (based on geomorphology), increase the extent and quality of spawning gravels; ensure that suitable migration and spawning flows are provided when adults are present; evaluate the existing flashboard dam for any potential effects to adult migration. Exclusionary riparian fencing has been constructed throughout nearly this entire reach and maintenance of fencing should continue.

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing**. The low gradient, low width-to-depth ratios, and sinuous meander patterns of Reach 2 as well as the documented high productivity (Lusardi, R. pers. comm. 2015), indicate that this reach provides suitable rearing habitat for juvenile coho salmon. However, while juvenile coho salmon have been observed within the upper portion of the reach (RM 32.9) during the spring and early summer, elevated summer water temperatures following the onset of the irrigation season appear to result in juveniles leaving the reach in search of cold water refugia within the upper watershed or downstream in the Klamath River. Adams (2013) noted that the timing and severity of the initial increase in stream temperatures above a tolerable level for juvenile coho salmon likely varies from year to year, and hypothesized that the consequence of this displacement may therefore be more detrimental in some years than others: earlier and more extreme high temperatures may force juvenile coho salmon to move before they are physically able to reach favorable conditions in some years. Similarly, Adams (2013) observed generally favorable flow and temperature conditions during the 2011 and 2012 smolt outmigration seasons, but noted that during warmer, drier years, conditions may become unsuitable for age 1+ coho salmon prior to the end of the outmigration season. An existing flashboard dam is operated to allow coho salmon smolt passage, but hydraulic passage conditions have not been evaluated, and juvenile spring redistribution conditions are unknown.

  Aquatic vegetation provides abundant cover and a source of food for rearing coho salmon during the spring and summer. However, these benefits cease once the aquatic vegetation dies back in the fall. Approximately 80 percent of this reach lacks woody riparian vegetation, and as a result, instream LWD is also lacking.

  Recommended Habitat Enhancement Actions: Reduce spring/summer water temperatures through improved flow/diversion management; encourage development of a healthy riparian vegetation corridor through fencing and development of grazing strategies; implement strategic placement of LWD to improve instream cover and habitat diversity; ensure unimpeded fish passage for all life stages throughout this reach.

- **Juvenile Over-Wintering**. Reach 2 is used by rearing coho salmon during the winter months (CDFW 2016). However, it is unknown which habitat types are being used during this time. The low gradient, low width-to-depth ratios, and sinuous meander patterns common throughout much of this reach appear to provide suitable winter rearing habitat. Evidence of historic over-wintering habitats such as backwaters, alcoves, side-channels, oxbows can be found throughout this reach, and opportunities to reestablish hydrologic connectivity to these features exist.

  Recommended Habitat Enhancement Actions: Conduct monitoring to determine juvenile over-wintering use of this reach; re-establish areas of connectivity between the main channel and historic over-wintering habitat; encourage development of woody riparian vegetation communities to provide a source of instream cover (LWD) and to create velocity refuge during high flow events; implement strategic placement of LWDin the channel.

3.3. Reach 3 - Big Springs Creek – Shasta River Confluence to Water Wheel (RM 0 to RM 1.6)

Big Springs Creek is a spring-fed tributary to the Upper Shasta River and is the dominant source of flow to the Upper Shasta River during the summer and spring. This reach includes approximately 1.6 miles of Big Springs Creek from its confluence with the Shasta River upstream to the edge of the property boundary, and the entire length of Little Springs Creek which is about 1 mile. In 2008, Jefferies et al. (2009) and Nichols et al. (2010) estimated that flows in Big Springs Creek averaged about 83 cfs during the non-irrigation season (October 1 to March 31) and decreased to a minimum flow of about 40 cfs during the irrigation season (April 1 to October 1). Reductions in flow during the irrigation season are primarily caused by surface water diversions and seasonal groundwater pumping from irrigation wells nearby.

Big Springs Creek provides the largest source of cold water, typically about 12 °C, within the entire Shasta River watershed. This constant supply of cold water makes the Big Springs Creek a critically important stream for coho salmon recovery and production of anadromous salmonids within the Upper Shasta River. However, decades of intensive cattle grazing in the past may have resulted in the loss of woody riparian vegetation that may have been present historically and has also led to severe erosion of the channel banks leaving a broad and shallow channel configuration that still exists today. Cattle have been excluded from the channel since 2009 when The Nature Conservancy (TNC) took ownership of the property within this reach. Once cattle were excluded from the channel, emergent and submergent aquatic vegetation within the stream channel grew rapidly during the spring and summer in response to spring water that is high in inorganic nitrogen and phosphorus. These high nutrient levels result in unusually high primary production within Big Springs Creek and the Shasta River downstream, forming a critical base of the aquatic food web (Nichols et al. 2010).

Species assemblages include submergent pondweeds (*Potamogeton* spp.) and elodea (*Elodea canadensis*), floating macrophytes including *Azolla* sp.and *Lemna* sp., and emergent wetland plants including tules (*Schoenoplectus acutus*) and cattails (*Typha latifolia*) along with several other species typical of spring-fed streams. The relatively constant flows and the rarity of high energy flood events also likely favor the rich growth of herbaceous wetland vegetation on the banks. Natural events that would create suitable physical conditions for recruitment of woody riparian species in the family Salicaceae are probably rare, but the historic vegetation cover in this reach cannot be known with certainty. Today the reach is strongly dominated by herbaceous aquatic and emergent vegetation, with hydrophytic wetland vegetation dominating the banks.

The growth of aquatic vegetation each summer provides several instream benefits for rearing salmonids. Once established, the aquatic vegetation greatly increases shading of the water column and reduces solar radiation which helps keep instream water temperatures cool. The aquatic vegetation also provides for a rich source of invertebrate food and abundant instream cover. Aquatic vegetation in this reach increases habitat diversity by creating diverse velocity profiles with abundant slow water habitats where salmonids can minimize energy expenditures while feeding. However, the benefits provided by aquatic vegetation are only realized seasonally and cease once the aquatic vegetation dies back in the late fall or winter

after air temperatures begin to drop below freezing. The channel lacks cover for rearing and over- wintering coho salmon after the aquatic vegetation dies back. In addition, the temperature benefits provided by the increased shading and narrowing of the channel thalweg are absent during the spring prior to the establishment of new aquatic vegetation growth. It is during the spring season that maximum water temperatures commonly exceed 20 °C. Temperatures at this level are known to have detrimental consequences to rearing coho salmon (Stenhouse et al. 2012) and juvenile coho have been observed avoiding specific habitats as temperatures begin to approach levels known to trigger avoidance behavior by fry and juvenile coho salmon (Chesney et al. 2010).

TNC purchased the majority of the ranch on Big Springs Creek in 2009 and has managed agricultural activities on the lands adjacent to Big Springs Creek through most of 2018. As part of the purchase agreements for the property and pursuant to the conservation easement, the California Department of Fish and Wildlife took discretionary authority of the water rights attached to the agricultural lands on September 30th of 2015. To ensure protection of fishery resources within Big Springs Creek the CDFW placed the following criteria on diversion of waters from Big Springs Creek or Little Springs Creek for irrigation purposes: Water rights for Little Springs Creek shall not be utilized and the 6.7 cfs water right from Big Springs Creek may only occur when maximum water temperatures at the mouth of Big Springs Creek are below 18 °C. The California Department of Fish and Wildlife is currently in escrow with TNC and is expected to take ownership of the property prior to 2019 and they will be responsible for management of the property and its water rights in the future.

Little Springs Creek is the sole tributary to Big Springs Creek whose confluence with Big Springs Creek is at about RM 0.47. Like Big Springs Creek, Little Springs Creek is entirely spring fed and is another important source of cold water (14.5 °C) for rearing coho salmon during summer months. An impoundment berm has been constructed around the spring source to aid diversion of water for irrigation. From this upper impoundment the creek generally flows in a northwesterly direction for approximately 1.5 river miles before entering Big Springs Creek. There are four culverts in the channel that currently create obstacles to fish passage. Two of these culverts were historically used as points of diversion for irrigation delivery to nearby pastures. Beginning in April 2013, diversions from the impoundment at the spring source and downstream diversions ceased, allowing the entire volume of spring water to flow down the Little Springs Creek channel and into Big Springs Creek (Deas et al. 2015). The current management results in a minimally variant flow regime throughout the creek and provides substantial benefits to coho salmon. During April 2013 through April 2014 flow averaged approximately 8 cfs.

Fish presence/absence data indicate that Little Springs Creek is used by anadromous salmonids. Stable flows and stable local geomorphology, coupled with aquatic vegetation (cover) provide juvenile rearing opportunities in Little Springs Creek. This area supports juvenile rearing throughout the year due to the suitable water temperatures and high level of macroinvertebrate production (Deas et al. 2015).

The following information summarizes limiting factors for freshwater life stage of coho salmon within Reach 3 and includes recommended management actions:

- **Adult Migration and Spawning.** Big Springs Creek is recognized as one of the primary coho salmon spawning grounds in the Shasta River watershed. Prior to The Nature Conservancy's (TNC) purchase of Big Springs Ranch, spawning success was thought to be limited by extensive cattle access to the channel, as active trampling of redds was observed in 2008-2009 (Jeffres et al. 2010). However, TNC has installed fencing through the entire stream reach to exclude livestock and protect the stream channel. This action has resulted in increased emergent vegetation and associated narrowing and deepening of a previously wide and shallow channel. The increased velocities also helped flush fine sediment deposits, revealing extensive areas of suitable spawning gravel. Streamflows are adequate to support adult migration and spawning within Big Springs Creek. Little Springs Creek, the major tributary to Big Springs Creek, does not provide spawning habitat as it lacks suitable substrates (Deas et al. 2015).

  Recommended Habitat Enhancement Actions: Maintain the existing riparian fencing that is protecting streambanks, increasing emergent vegetation and narrowing the channel morphology.

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing.** Juvenile Chinook salmon observed rearing in Big Springs Creek grow at a rapid rate due to abundant food resources and the high quality habitat found in Big Springs Creek (Jeffres et al. 2010; Lusardi pers. com. 2015), and the same conditions likely support successful coho salmon rearing under existing conditions. However, instream cover and habitat diversity is seasonally limited until the growth of emergent vegetation begins in the spring. The narrowing and deepening of the Big Springs Creek channel appears to provide adequate depths for juvenile spring redistribution and smolt outmigration. Chesney et al. (2010) and Adams (2013) documented spring immigration of juvenile coho salmon from the mainstem Shasta River into Big Springs Creek as well as to springs sources in the Upper Shasta River and Parks Creek. Recent investigations conducted by the CDFW (CDFW 2016) describe the movements and survival of the 2012 coho salmon brood year and confirm many of the findings described by Chesney et al. (2010) and Adams (2013). As water temperatures approach 20 °C juvenile coho salmon begin to exhibit avoidance behavior and begin to seek out cold water habitats generally associated with spring inflows.

  Little Springs Creek also provides non-natal juvenile coho salmon rearing habitat with documented favorable summer water temperatures and abundant food resources (Deas et al. 2015). As mentioned above, the four culverts present along the length of the creek create

fish passage obstacles to migration. The upper impoundment at the spring source is completely exposed to solar radiation causing some increased warming of the creek prior to flowing downstream.

Recommended Habitat Enhancement Actions: Maintain the existing riparian fencing that is protecting streambanks and the channel, allowing increased abundance of emergent vegetation and narrowing of the channel morphology; increase channel roughness and habitat complexity through targeted plantings of woody riparian species; implement placement of in-channel LWD to improve habitat diversity and cover for coho salmon during the late fall, winter and spring (Jeffres et al. 2009); and, remove passage obstacles and barriers on Little Springs Creek.

- **Juvenile Over-Wintering.** Adams (2013) documented substantial fall redistribution of juvenile coho salmon within the upper Shasta River and Parks Creek, suggesting that while some areas of the watershed may become unfavorable in winter, other areas within the watershed are meeting the over-winter rearing needs of coho salmon. Adams (2013) observed substantial movements of juvenile coho salmon out of Big Springs Creek in the fall and hypothesized that winter may be associated with seasonal change in physical habitat in the Big Springs Reach. A large portion of the macrophyte growth, which provides most of the complex habitat in Big Springs Creek, begins to die back after the first hard freeze in the late fall. This loss of habitat complexity may stimulate juvenile coho salmon to seek more suitable habitat elsewhere. Adams (2013) notes that many individuals moved from Big Springs Creek to over-winter in the Upper Shasta River Reach. Those juvenile coho salmon from the 2012 brood year that remained in Big Springs Creek over the winter months exhibited poor survival (28%) relative to those cohorts that over wintered in the Shasta River below Big Springs Creek (71% survival), in the Upper Shasta River (54% survival), or in Parks Creek (55% survival) (CDFW 2016). Lack of cover from predators may be a factor responsible for the lower winter survival rates that were observed.

- **Recommended Habitat Enhancement Actions:** Maintain the existing riparian fencing that is protecting streambanks and allowing for increased emergent vegetation and narrowing of the channel morphology; and, increase channel roughness and habitat complexity through targeted woody riparian planting and placement of in-channel LWD.

3.4. Reach 4 - Upper Parks Creek – Interstate 5 Crossing to Upstream Boundary of Covered Area) (RM 8 to RM 14.5).

Unlike the Shasta River downstream of Dwinnell Dam, the hydrology of upper Parks Creek is dominated by rainfall and snowmelt. The annual hydrograph is typical of snowmelt dominated systems characterized by high flows in the winter and spring, followed by gradually decreasing flows through the summer, with the lowest flows typically occurring in late summer and fall. Various estimates of monthly unimpaired instream flows for Parks Creek and the Shasta River are summarized in Table 6 of the "Shasta River Big Springs Complex Interim Instream Flow Needs Assessment" (McBain and Trush, Inc. 2013). Deas and Null (2007) estimated the unimpaired flows for lower Parks Creeks at the confluence of

the Shasta River during the spring emigration period to be 110 cfs in March, 52 cfs in April, and 71 cfs in May. Northwest Hydraulic Consultants Inc. (NHC) summarized the available hydrologic data for Parks Creek to help conduct preliminary designs for MWCD's diversion from Parks Creek to the upper Shasta River (NHC 2011). Based on information reported by the Watermaster for 1959 to 1998, NHC (2011) estimated the unimpaired mean annual flow for Parks Creek to be approximately 25 cfs. Average monthly flows range from a high of 61.8 cfs in May to a low 5.2 cfs in September (NHC 2011). All of these estimates are based on limited data sets which are confounded by a long history of water development within the basin. Regardless, these studies provide a general description of the natural hydrograph under which anadromous salmonids were exposed during their freshwater life history phases. In recent years the Shasta River basin has experienced very dry conditions. The 2010 (82.1% exceedance), 2013 (83.3% exceedance), and 2014 (96.2% exceedance) water years were all critically dry and the 2012 (66.7% exceedance) water year was dry. The 2011 water year was wet (27.9% exceedance) and is the only year since 2010 that was not a dry or critically dry year (based on the USGS gage on the mainstem Shasta River near Yreka).

There is a privately operated stage data collection site located in the lower portion of Reach 4 just a short distance upstream of the Interstate 5 bridge crossing. Although the stage discharge relationship for this gage has not been certified, the information collected does provide insight into the summer instream flow patterns that have occurred at this location since July of 2011. For water years 2012 through 2015, which were all dry or critically dry water years, the mean monthly flow estimates for April and May were 16.0 cfs and 12.9 cfs, respectively. By late summer, flows at this location have generally fallen to less than 1.0 cfs and in both 2012 and 2014 there were periods when flows had decreased to 0 cfs.

The Shasta River Adjudication allows for diversion of water for beneficial uses during the winter as well as during the spring and summer irrigation seasons. In Parks Creek the standard irrigation season extends from March 1st through October 31st. The winter diversion extends from November 1st through February 28th. There are seven points of diversion within the Upper Parks Creek Reach excluding the MWCD Parks Creek diversion and canal. These seven diversions have a decreed right to divert up to about 35.7 cfs during the irrigation season and 17 cfs during winter. The MWCD has a low priority water right to divert a total volume of 14,000 acre-feet from Parks Creek to the upper Shasta River for storage in Lake Shastina through the Parks Creek canal from October 1st through June 15th.

The riparian habitat of Upper Parks Creek can be described as open water (57.5 percent), woody riparian (39 percent), and herbaceous emergent and wetland (4 percent). From a stream geomorphology and coho salmon habitat perspective, the Upper Parks Creek Reach can be divided into three different sub-reaches. The most upstream sub-reach includes about two miles of stream channel upstream of the Old Highway 99 Bridge. This upper sub-reach lies within the transitional zone between the mountain interface and the valley floor. Quantitative data describing the current channel morphology and habitat characteristics present within the upper sub-reach is currently unavailable. Habitat descriptions are therefore qualitative in nature and are derived from limited brief site visits and satellite imagery available through Google earth. Stream gradients in the upper sub-reach generally exceed 3% and the streambed is primarily composed of cobble and small boulder substrates.

In the lower portions of the upper sub-reach the stream channel is dominated by alluvial bars with sparse riparian vegetation. Woody riparian vegetation, where present, is sparse and does not provide significant cover. The upper sub-reach has been mapped as 100 percent open water, but unlike other reaches with no riparian canopy, this sub-reach does not appear to be capable of supporting an extensive woody riparian canopy due to the steepness of the system, high bedload, flashy flooding regime, and other factors.

The middle sub-reach continues for about 1.8 miles of stream channel downstream of the Old Highway 99 Bridge and upstream of to the railroad crossing. Stream gradients in this sub-reach average about 2 % and substrates area mostly comprised of a mix of cobble and gravel suitable for spawning. In contrast to the upper sub-reach, the woody riparian vegetation community in the middle sub-reach is extensive (approximately 80 percent of the sub-reach), is relatively healthy, provides relatively good shading and instream cover and helps protect stream banks during high flows. The woody riparian vegetation in the middle sub-reach is mature and diverse, with white alders, cottonwoods (*Populus* spp.), water birch, willows (*Salix* spp.), and at least three species of conifer providing cover and structure. Spawning and rearing habitat quality is generally in good condition throughout most of this alluvial sub-reach. Water temperatures are generally suitable for rearing coho salmon throughout most of the year however, detrimental temperatures (>20.3°C) for rearing coho salmon have been measured during July in recent years.

The lower sub-reach is about 2.7 miles in length and lies between the railroad crossing and Interstate 5. Portions of the lower sub-reach are currently heavily degraded. Channel and floodplain alterations likely related to construction of an historic railroad crossing have straightened the channel, reduced the thalweg length, and increased the channel slope. These historic alterations appear to have caused the channel to scour down to hard pan in many locations. During high flows, suspended sediment is currently transported through this reach eliminating accumulation of alluvial material necessary for bar formation, creation of channel meanders and maintenance of floodplain function. Riparian vegetation is sparse to patchy, particularly in the upper portion of this sub-reach near the railroad crossing. Further downstream, alluvial bar features begin to accumulate in greater frequency and, along with these alluvial bar features, instream habitat begins to improve and the presence of riparian vegetation also increases. The PCE gage is located in the lower portion of the lower sub-reach where alluvial bars are present. Low flows and high water temperatures limit coho salmon use of habitat in this portion of the lower sub-reach during the summer and early fall.

The following information summarizes limiting factors for each life stage of coho salmon within Reach 4 and includes recommended management actions:

- **Adult Migration and Spawning.** While anecdotal evidence of adult coho salmon occurrences in the Upper Parks Creek Reach exists, currently, a partial migration barrier in the immediate vicinity of Interstate 5 that is thought to impede adult access to the Upper Parks Creek Reach, and coho salmon spawning has not been documented in this reach[1]. The

[1] This barrier is located on a property at present not included in the Covered Area, but efforts to remediate this feature are underway.

winter hydrology of Upper Parks Creek is dependent on precipitation and can vary greatly in response to precipitation and run-off events. Winter water rights on Upper Parks Creek include MWCD's diversion to storage in Lake Shastina (operated under a 6 cfs October-through-February bypass flow requirement), as well as higher priority rights upstream of MWCD's diversion canal. For the Mid Parks Creek Reach immediately downstream, McBain & Trush (2013) estimated that a streamflow of 8 cfs would provide suitable migration conditions, while 10 cfs would provide suitable spawning conditions for coho salmon in Parks Creek below this reach. However, there have not been any investigations to determine actual flow levels that would provide adequate migration and spawning conditions for coho salmon in this reach. Therefore, it is unknown whether the McBain & Trush (2013) flow recommendations apply to habitats in this reach. Under current conditions, flows estimated to be sufficient for migration and spawning are met at times when rainfall events elevate base flows, however due to the rapid decline in the hydrograph, the flow requirements of adult coho salmon are generally of short duration. The extent to which winter water right diversions may affect the natural frequency and duration of suitable conditions is currently unknown.

Recommended Habitat Enhancement Actions: Conduct further flow studies to support a diversion management plan; develop and implement a coordinated diversion management plan to enhance fall winter flows; evaluate potential geomorphic impediments to fish passage and develop a channel rehabilitation plan and design and implement projects to remediate fish passage obstacles and barriers to allow adult coho salmon access to upper Parks Creek; evaluate spawning habitat improvement opportunities and design and implement projects that are identified through the evaluation.

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing**. Juvenile coho salmon are currently not known to utilize the Upper Parks Creek Reach for spring redistribution, smolt emigration, or summer rearing. The factors responsible for this current lack of juvenile utilization are speculative and include the barrier mentioned previously in the vicinity of I-5 that may prevent adult and/or juvenile coho salmon from accessing unseeded habitat upstream. Existing hydrologic data for Upper Parks Creek is highly limited, and the spring and summer hydrographs are poorly understood. MWCD maintains a 15.85 cfs bypass flow at its diversion site during the March through mid-June juvenile redistribution and smolt outmigration period. Higher priority water rights upstream and downstream of MWCD's diversion may result in localized areas of shallow water depths that could impede juvenile movement. During the summer, diversions, accretions, and naturally declining baseflows create variable flow conditions. As described above, the Upper Parks Creek Reach consists of three geomorphologically distinct sub-reaches. Above Old Highway 99, Parks Creek flows through a broad alluvial that regularly loses surface flows in the summer. However, between Old Highway 99 and the railroad crossing bridge, subsurface accretions appear to support relatively high quality physical habitat conditions for summer rearing, including some springs inflows, mature woody riparian corridor, and instream habitat complexity for juvenile coho salmon rearing. The sub-reach downstream of the railroad crossing, which has been degraded by historic activities likely associated with railroad construction, currently provides suboptimal rearing habitat due to channel incision (including several head-cut

nick points that may impede juvenile upstream passage), lack of riparian habitat, and limited instream cover. Spot data describing summer daytime water temperatures in this reach suggest that existing conditions may exceed the temperature suitability range for juvenile coho salmon.

Recommended Habitat Enhancement Actions: Implement projects to remediate fish passage obstacles and barriers to juvenile coho salmon movement; develop and implement a coordinated diversion management plan to augment flow and water quality conditions; implement investigations of the hydrograph and hydrologic conditions (flow, temperature, groundwater/surface water interaction, surface/subsurface return flows, etc.) to evaluate the potential of sub-reaches to support rearing juvenile coho salmon; and, install riparian fencing and develop a riparian management plan to encourage development of a mature riparian vegetation community to stabilize channel banks and to improve floodplain connectivity and function.

- **Juvenile Over-Wintering.** Similar to summer rearing habitat conditions described above, over-wintering habitat in Upper Parks Creek also varies by sub-reach, with the channel upstream of Old Highway 99 likely experiencing excessive velocities during high discharge events, the channel between Old Highway 99 and the railroad bridge offering valuable instream habitat complexity and refuge, and the reach below the railroad lacking velocity refuge.

  Recommended Habitat Enhancement Actions: Evaluate the feasibility and cost-benefit of channel rehabilitation below the railroad crossing; improve access to and the quality of off channel habitats present within the flood plain in the middle reach between old Highway 99 Bridge and the railroad crossing.

3.5. Reach 5 - Mid-Parks Creek – Upstream of Kettle Springs Confluence to Interstate 5 Crossing (RM 2 to RM 8)

Prior to European settlement, during and immediately after the gold rush in the mid 1800's, and perhaps even into the early twentieth century, much of this reach was comprised of large marsh habitats which likely contained multiple meandering channels threading through the poorly draining matrix facies of the Pleistocene debris flow, maintained by high flows and sediment transport processes that occurred each winter. In an era pre-dating the current owner by many decades, the marsh was reclaimed to provide pasture land for cattle production.

The current creek morphology can be described as a low gradient single thread alluvial channel that flows in a southwest to northeast direction. Bridge Field and Black Meadow springs surface along the southeast side of the valley and former marsh and provide a consistent source of cold water. Davids Engineering, Inc. (2011) estimated discharge from three Bridge Field Spring locations and determined that flow fluctuates throughout the year from a low of 1.5 cfs in the winter to a high of 5.7 cfs in the summer. Black Meadow Spring also fluctuates from 0.5 cfs during the winter to 1.3 cfs during mid-summer. About 2.6 cfs of Bridge Field spring is used for irrigation purposes. There are approximately five other active points of diversion from Parks Creek within this reach that are identified under the Shasta River Decree. These five diversions

have adjudicated rights to divert a total of about 16 cfs during the irrigation season between March 1 and October 1.

Woody riparian vegetation is present but scarce throughout the reach (less than one percent of the reach), however riparian fencing has recently been installed and the abundance of emergent and submergent riparian vegetation has increased. Recruitment of woody riparian species (i.e. willow species) is evident in some locations, but willows currently provide little cover. Despite the current lack of woody cover on streambanks, some cover is provided to the relatively narrow channels by herbaceous vegetation in the channels and on the banks. Herbaceous emergent and wetland vegetation dominates 79 percent of this reach, and open water dominates approximately 20 percent, primarily in the upstream portion of the reach. Based on preliminary riparian vegetation mapping conducted by CDFW for the Agreement, Mid-Parks Creek appears to rapidly transition from a runoff dominated system to supporting groundwater/spring influenced vegetation less than one mile northeast of Slough Road. Open water dominates above this transitional area.

Sediment is transported through the reach during flood events and suitably sized spawning gravels for coho salmon are common in riffle and run habitats, particularly in the upper sections downstream of Interstate 5 to below river-mile 5.

The following information summarizes limiting factors for each life stage of coho salmon within Reach 5 and includes recommended management actions:

- **Adult Migration and Spawning.** Adult coho salmon have been observed spawning throughout most of the upper four miles of this reach. Based upon habitat mapping of riffles composed of spawning sized gravels and riffle crest thalweg depths, McBain & Trush, Inc. (2013) recommended a minimum flow of approximately 10 cfs to provide adequate conditions for spawning anadromous salmonids and 8 cfs for migration of adult coho salmon. Higher streamflows would provide more spawning habitat, but the rate of increase in spawning habitat area would decline as flows increase. Depending on the timing, magnitude and duration of storms passing through this area in late fall and early winter, low flows can hamper access to spawning habitat in this reach for coho salmon. As was previously described, since 2010 the Shasta River has experience very dry conditions. Even under these dry conditions, in 2012 coho salmon were able to access spawning habitats in this reach by taking advantage of pulse flows caused by the seasonal rain storms and spring flows emerging in Parks Creek from the North Slough. In 2010, coho salmon spawned between the Dukes and Slough Road (CDFW 2011) and in 2013 several coho salmon were able to spawn successfully in the area near the confluence of the North Slough and Parks Creek. Areas further upstream where coho salmon were observed spawning in 2010 were accessible as well (CDFW 2014).

  Recommended Habitat Enhancement Actions: Develop and implement a coordinated diversion management plan that provides coho salmon access to spawning habitat and maintains spawning habitat; install and maintain riparian fencing and manage riparian zones to encourage development of mature riparian vegetation communities; and,

increase channel roughness and large wood through woody riparian planting and placement of in-channel LWD to improve substrate sorting and reduce fines; conduct spawning gravel augmentation in select locations

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing**. Spring flows in Mid-Parks Creek vary widely dependent on hydrologic conditions in the rainfall and snowmelt-dominated watershed. As described above for the Upper Parks Creek Reach, historic instream flow data describing spring and summer flow characteristics is lacking. However, more recent stage data is available from a privately operated gage located upstream of Interstate 5 for the period (July 2011 to June 2015). The gage was originally operated by the California Department of Water Resources and is located on Parks Creek near Edgewood (PCE). Instream flow estimates for this gage provide an indication of the general flow characteristics entering the Mid Parks Creek Reach in recent years. Unfortunately, hydrologic conditions have been dry or critically dry since 2012. Therefore, available gage data does not provide information needed to fully describe habitat conditions that exist under more normal or wetter hydrologic conditions. However, more quantitative water management data are expected to become available in the future through research and monitoring efforts incorporated in this Safe Harbor Agreement.

  Under dry conditions, recently observed flows in April have averaged approximately 16 cfs, declining to approximately 6 cfs by early June. Based on qualitative observations of three different streamflow levels at two locations aimed at estimating flows necessary to initiate channel bench inundations, McBain & Trush, Inc. (2013) recommend minimum instream flows ranging between 20 and 25 cfs during the spring (April 1 to June 15) to provide juvenile rearing habitat and increase stream productivity during the snowmelt runoff period in both the Mid Parks Creek and Lower Parks Creek Reaches. In recent periods of hydrologically dry years, flow levels observed for the Mid Parks Creek Reach have been below minimum recommendations presented by McBain & Trush, Inc. (2013) for rearing juvenile salmonids during the spring snow melt period.

  Summer rearing habitat in the Mid Parks Creek Reach is currently limited by poor water quality and flow. Water temperatures in much of the reach typically exceed those preferred by rearing coho salmon and commonly exceed lethal temperature thresholds in the upstream segments of this reach. The stream channel has been degraded by uncontrolled grazing in the past. As a result of these historic practices, the channel has widened, bank stability has been compromised and mature woody riparian trees are lacking throughout most of the reach. These factors increase exposure of the stream channel to solar radiation resulting in additional warming of the water column. Pool and riffle habitats are present throughout the reach, however, many lack cover complexity in the form of overhanging vegetation and large woody structures. Riparian fencing has recently been installed and the complexity and amount of emergent and submergent aquatic vegetation has increased in recent years. Colonization of woody riparian species has begun and is anticipated to improve habitat conditions over time by narrowing the channel, reducing solar radiation and increasing cover complexity and channel diversity instream. Nonnative species such as sunfish (Centrachidae sp.) and bullfrogs (*Rana*

catesbeiana) have been observed within this reach. Juvenile salmonids are vulnerable to predation by these species, particularly as water temperatures warm during the summer. To optimize thermal conditions under the current channel configuration, McBain &Trush, Inc. (2013), recommended a summer rearing flow of 2 cfs. Based on available information , even though coho salmon temperature thresholds would be exceeded in the mainstem of Parks Creek, a flow at this level would still help preserve existing cold water thermal refugia habitats and provides connectivity for invertebrate production and other native fishes.

While conducting snorkel surveys during the summer of 2011, Carson Jeffres of U.C. Davis documented juvenile coho salmon over summering in pool habitats in the alluvial reach from North Slough upstream to about RM 7. Cold water contributions from interconnected groundwater provided cold water sources that were able to support juvenile coho salmon throughout the summer. Although juvenile coho salmon have not been documented rearing in Black Meadow or Bridge Field springs during the summer, both of these locations provide a source of cold water that may be capable of supporting coho salmon over the summer. Rearing habitat is limited to small areas of thermal refugia associated with either spring flow contributions or direct connections with groundwater.

Recommended Habitat Enhancement Actions: Increase the extent, reliability, and connectivity of existing cool water refugia areas in this reach, guided by existing or future temperature models; develop and implement a restoration strategy for Bridge Field and Black Meadow springs, creeks, and sloughs; install and maintain riparian fencing to encourage development of mature riparian communities, stabilize channel banks, and to improve floodplain connectivity and function; and, introduce large roughness elements in the channel to improve substrate sorting, reduce fines, and increase cover.

- **Juvenile Over-Wintering.** The alluvial channel immediately downstream of Interstate 5 contains alternate bar characteristics that may provide limited refuge from high velocities at intermediate flood flow events. Further downstream, near the confluence of the North Slough, the meander frequencies decrease and secondary off-channel features disappear. During large flood events, sheet flows spread across adjacent pasture lands and juvenile salmonids may be vulnerable to standing as flows recede. However, the North Slough and the small spring-fed channels that feed into the slough may provide important over wintering habitats and areas of refuge during large flood events, though there is no data to support this hypothesis. In addition, these spring-fed channels and sloughs help moderate water temperatures downstream of the confluence with Parks Creek, and provide favorable rearing conditions for coho salmon.

  Recommended Habitat Enhancement Actions: Develop and implement a restoration strategy for Bridge Field and Black Meadow springs, creeks, and sloughs; encourage development of mature riparian vegetation communities; stabilize channel banks; evaluate opportunities for floodplain restoration incorporating off-channel habitat features (i.e., side-channels, alcoves, backwaters); and, introduce large roughness elements to the channel to increase cover during high flow.

3.6. Reach 6 - Lower Parks Creek – Shasta River Confluence to Kettle Springs Confluence (RM 0 to RM 2)

Historically, cattle have had free access to the stream channel throughout this entire reach and this has degraded the channel in several ways. Woody riparian vegetation is lacking along with important riparian functions including instream cover, LWD and undercut banks. The stream channel meander pattern may have also been reduced by previous management activities that were intended to improve irrigation efficiencies within the reach. However, all of the stream channels and banks in this reach support some aquatic and emergent herbaceous cover despite cattle access. An experimental cattle exclosure fence on the Parks Creek overflow channel has resulted in the recruitment of patchy woody vegetation. The gradient and hydrologic regime of this reach generally appears to favor herbaceous species over woody species, and it is uncertain whether trees and shrubs may become more common with future riparian fencing.

There are no tributary streams that originate from higher elevations entering this reach. Therefore channel and flow characteristics predominantly reflect contributions from Mid-Parks Creek and Kettle Springs and water right diversions necessary to irrigate agricultural lands and provide stock water for cattle. As previously discussed for the Upper and Mid Parks Creek Reaches, data describing the current instream flow characteristics entering this reach is limited to data gathered since 2012 at the PCE gage upstream of Interstate 5 in the Mid Parks Creek Reach. All of these water years have been either dry (2012, 2015) or critically dry (2013, 2014) and therefore information to describe average hydrologic conditions is currently not available. The mean monthly spring flows observed during the recent drier water years are estimated to be 11.4 cfs in March, 16.0 cfs in April, and 12.9 cfs in May. Davids Engineering, Inc. (2011) estimated average inflows for Kettle Springs at 7.1 cfs, while contributions from Bridge Field and Black Meadow springs were about 2.7 cfs and 0.8 cfs, respectively. Additional stage data is available in the lower portions of this reach, downstream of all agricultural diversions from Parks Creek near the Big Springs (PBS) gage. The lack of a reliable stage discharge rating curve for the PBS gage complicates development of historic instream flow characteristics for the Lower Parks Creek Reach. Davids Engineering, Inc. (2011) developed a water balance summary for the Lower Parks Creek Reach for the 2010 irrigation season (May through September) and estimated that instream flows in Lower Parks Creek just upstream of the Shasta River ranged from 0 (negative return flow to the channel) to 3.4 cfs.

Kettle Springs contributes 6-7 cfs of cold water at the head of a tributary creek that flows in a northwesterly direction through a meandering channel for about 1.5 miles where it joins Parks Creek just upstream of an existing flashboard dam. The rate of flow is not constant but varies annually and seasonally. The spring source is captured by an earthen dike and head gate which serves to raise the water surface elevation for diversion in order to irrigate pastures along the north and south side of the creek. Kettle Springs and the creek have recently been fenced to exclude cattle from the stream channel, to protect the stream banks, and to encourage riparian vegetation growth to improve habitat conditions for salmonids. Kettle Springs provides an important source of cold water refugia habitat for fry and juvenile coho salmon during the late spring and summer (Chesney et al. 2010). There is a water right of 1.15 cfs of flow from Kettle Springs for irrigation purposes.

A flashboard diversion dam is located on Lower Parks Creek just downstream of the confluence of Kettle Springs Creek. During the irrigation season flashboards are placed over the culverts creating an impoundment inundating approximately 25 acres. The impoundment creates a heat sink causing water temperatures to rise, resulting in adverse conditions for salmonids and favorable habitat for nonnative sunfish and bass known to prey on juvenile salmonids. In its current configuration, operation of the diversion creates a barrier to fish passage, and increases stream temperatures downstream (Michael Love & Associates, Inc. and GHD Inc. 2013). A water right for 2.98 cfs accompanies this point of diversion during the irrigation season.

Downstream of the flashboard dam, Lower Parks Creek flows for about 1.75 miles in a northeasterly direction where it joins the Shasta River. The current channel is degraded by unrestricted cattle grazing. The riparian zone is dominated by rushes, grasses, and sedges, and increased bank sloughing and erosion from cattle grazing is evident. These physical changes have increased the amount and duration of solar radiation reaching the water surface. High water temperatures and low flow conditions limit the suitability of this reach to support rearing salmonids during the late spring and summer and may also create thermal barriers to migration during the spring when air temperatures rise. With improved grazing management under the Agreement, more woody riparian vegetationis expected to grow, based on the exclosure experiment conducted in the Parks Creek overflow channel.

The current channel lacks habitat diversity and instream cover that would have likely existed historically in the form of undercut banks and perhaps woody debris. Riparian fencing has recently been installed in the lower 3/4-mile of the reach to protect the streambank and riparian areas from cattle grazing and herbaceous vegetation has already colonized the streambanks, providing shade to the channel. In addition, submergent and emergent vegetation is growing within the channel creating a more diverse velocity profile as well as creating some additional cover features important to rearing salmonids in this reach.

The following information summarizes limiting factors for each life stage of coho salmon within Reach 6 and includes recommended management actions:

- **Adult Migration and Spawning.** Adult coho salmon spawning is generally limited to the downstream sections of this reach. McBain & Trush, Inc. (2013) found that minimum flows of at least 8 to 10 cfs are needed to provide adequate conditions for migration of coho salmon. Based on McBain &Trush (2013), most of the potential spawning habitat present in the main channel may become suitable for spawning once flows reach 9.9 cfs, and the amount of suitable spawning habitat would continue to increase if flows increase further. At some point the rate in which the amount of habitat increases with higher flows begins to decline because water velocities become too swift and the amount of spawning habitat will decrease as flows continue to rise. Irrigation diversions during October reduce migration flows and reduce available spawning habitat, particularly in early fall. In drier water years winter diversions for stockwater can also negatively affect migration and spawning habitat conditions by reducing the available

instream flows. Operation of an existing flashboard dam within this reach may impede adult coho salmon passage at certain flows.

Recommended Habitat Enhancement Actions: Develop and implement a coordinated diversion management plan; install riparian fencing and encourage development of mature riparian vegetation communities to stabilize channel banks, improve floodplain connectivity and function; introduce large roughness elements to the channel to improve substrate sorting and reduce fines; and, remediate the potential adult migration barrier at the existing flashboard dam.

- **Juvenile Spring Redistribution, Smolt Emigration and Summer Rearing**. McBain & Trush, Inc. (2013) recommended a flow of 20-25 cfs to improve smolt rearing habitat and to increase stream productivity during the snowmelt runoff period, and estimated that flows of 22 cfs would keep water temperatures from exceeding 19ºC through Mid June. These recommendations are based on qualitative observations of three different streamflow levels at two locations that were aimed at estimating flows necessary to initiate channel bench inundations. During the summer, McBain & Trush, Inc. (2013) recommend a rearing flow of 7 cfs in this reach. Flows at this level would optimize cold water contributions from spring sources upstream and would allow thermal connectivity through the reach such that rearing salmonids could access thermal refugia habitats upstream. The McBain & Trush, Inc. (2013) recommendations are based on current channel and riparian conditions. As habitat and riparian restoration actions lead to improvements in channel morphology and riparian vegetation conditions, instream flow recommendations may need to be reexamined to optimize conditions for rearing coho salmon.

  Recommended Habitat Enhancement Actions: Develop and implement a coordinated diversion management plan; install riparian fencing and encourage development of mature riparian vegetation communities to stabilize channel banks, improve floodplain connectivity and function; introduce large roughness elements to the channel to improve substrate sorting and reduce fines; and, remediate the potential adult migration barrier at existing flashboard dam.

- **Juvenile Over-Wintering.** The lower Parks Creek Reach generally flows through open, low-gradient pasture lands that likely were historically comprised of open marsh lands with multiple channels. During large flood events water distributes as sheet flow across the entire valley floor, including the overflow channel to the north where Parks Creek flowed historically. This trait, combined with the low gradient characteristics of the stream channel greatly reduces the amount of energy that may be conveyed to the stream channel and adjacent pasture lands. During these events, juvenile coho salmon may occupy adjacent pasture lands and seek refuge in irrigation ditches, ponds, or other topographic features that provide shelter from higher water velocities. As floods recede fish in these locations may be vulnerable to stranding, should they seek refuge in locations that do not connect back to the active stream channel. Spring fed channels, such as Kettle Springs Creek, which does connect to Parks Creek, would not be impacted

by high-flow events and may provide over wintering habitat. Spring creek channels typically provide over-wintering habitat for juvenile coho salmon.

Recommended Habitat Enhancement Actions: Install riparian fencing to encourage development of mature riparian vegetation communities to stabilize channel banks; investigate floodplain restoration that incorporates off-channel habitat features (i.e., side-channels, alcoves, backwaters); and introduce large roughness elements to the channel increase cover during high flow.

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APPENDIX 3: Covered Activities and Avoidance and Minimization Measures

Covered Activities and Avoidance and Minimization Measures for the Shasta River Safe Harbor Agreement Siskiyou County, California.

By:

Shasta Watershed Conservation Group Technical Advisory Committee

November 21, 2018

Covered Activities and Avoidance and Minimization Measures

This section outlines and describes all activities that may be implemented under the Template Safe Harbor Agreement (SHA) including Routine Land and Water Use Activities, Avoidance and Minimization Measures (AMMs), monitoring and Beneficial Management Activities (BMAs).

The Template SHA provides Permittees with ESA assurances that efforts to promote the conservation and recovery of the Covered Species on their enrolled property, including implementation of Routine Land and Water Use Activities, AMMs, monitoring, and BMAs, will not result in additional restrictions on the use of the enrolled property.

Permits will authorize take of SONCC coho salmon incidental to the rights, obligations, and activities contemplated in the Template SHA provided that such take is consistent with maintaining the Present and Elevated Baseline Conditions identified in site plan agreements. The specific activities that will be implemented by each Permittee on their enrolled property under the Template SHA are described in individual Site Plan Agreements. Each Permittee has selected appropriate property-specific activities from this section in coordination with NMFS and CDFW, and included in their Site Plan Agreement.

1. Routine Land and Water Use

Land and water management practices considered under the Template SHA for which incidental take will be authorized on the enrolled properties are standard practices for production of livestock, pasture and hay, and other routine associated activities. For the purposes of the Agreement, standard practices for production of livestock, pasture and hay means: any lawful practices performed by a Permittee, and persons associated with the Permittee, that are incident to or in conjunction with livestock, pasture and haying operations including crop production, cultivation, growing, replanting, diversion of water, irrigation, irrigation runoff management (tailwater), harvesting, preparation for market, vehicle operation, moving of livestock and watering of livestock. Other routine associated activities include riparian area cultivation and maintenance, monitoring infrastructure activities, erosion control, flood and emergency protection, invasive plant removal and control, and installation, repair, maintenance and operation of: diversions, fish screens, instream habitat structures, fences, roads, and stream crossings. These activities will be described, as appropriate, by each Permittee within their Site Plan Agreement. The potential effects of Routine Land and Water Use activities on the Covered Species shall be minimized and avoided through the implementation of AMMs.

The Template SHA and Site Plan Agreements will grant NMFS and CDFW, after reasonable prior notice to the Permittees, access (in any form, including aerial) to enrolled properties for purposes of technical assistance related to monitoring and implementation, and to ascertain compliance with the Template SHA and Site Plan Agreements. Implementation monitoring of Routine Land and Water Use Activities and AMMs as specified in Individual Site Plan Agreements will be accomplished by the Permittees or their consultants, with the assistance of the Parties, when appropriate, on a schedule specified in each Individual Site Plan Agreement, and using specific protocols set forth below. Permittees will document implementation of AMMs on their enrolled property using the monitoring protocols set forth below and submit documentation to the Parties in an annual report.

2. Water Diversion and Diversion Facilities

Water diversions included under the Template SHA include diversions of surface water through conduits or openings from streams, channels, or sloughs within the geographic scope of the Template SHA (as shown in Figure 1 of the Template SHA) by a Permittee in accordance with a valid water right including the following activities associated with water diversion and diversion structures:

- Ongoing management and/or maintenance of existing flashboard dams, including the placement of boards into concrete abutments across the wetted channel to build head to divert water, and the removal of the boards.
- Ongoing maintenance, management, and repair of boulder weirs.
- Installing, operating, maintaining, and removing push-up dams or weirs. These are defined as temporary diversion structures created by using loaders, backhoes, or excavators to move bedload within the stream channel to form a flow barrier or weir that seasonally diverts a portion of the flow of the stream.
- Installing, operating, maintaining, and removing other temporary diversion structures that are not push-up dams. “Other temporary diversion structure” is defined as any temporary structure to divert water seasonally from a stream and is typically made with hay bales, hand-stacked rocks and cobble, tarps, wood, and/or a combination of these materials placed in the channel with or without the use of heavy equipment. Equipment may be used from the bank but not within the channel.
- Installing or placing pumps and sumps and maintaining existing pumps and sumps within or adjacent to the active channel of a stream, which sometimes requires the use of large machinery within or adjacent to the active channel.
- Installing head gates and measuring devices that meet NMFS and CDFW standards and is in compliance with Senate Bill 88 on or in a diversion channel, which usually is done by excavating the site to proper elevation using large machinery, positioning the head gate and measuring device at the appropriate elevation, and installing rock or other “armoring” around the head gate to protect the structure. During installation, the stream bank could be affected by the construction of concrete forms and other necessary construction activities.
- Operating head gates and measuring devices

<u>The following AMMs may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements)</u>:

A1. Install a locking head gate or valve sized appropriately for the authorized diversion, that can regulate flow, and a functional measuring device or flow meter on any structure or facility connected to a stream used to divert water to facilitate better control and monitoring of water delivery within three years, unless specified otherwise in the site plan, of the effective date of the Agreement on or in all water diversion structures identified in this Agreement. The designs for head gates or valves and measuring devices in State Watermaster or Special Watermaster District Service areas shall be approved by DWR or said Special District, if applicable, in coordination with the Parties. All measuring devices and methods of water measurement shall be constructed and maintained to meet a 10% measuring accuracy for points of diversion that divert greater than or equal to 200 acre feet per year, and a 15% measuring accuracy for points of diversion that divert less than 200 acre feet per year. Data from these devices will be included

in the annual SHA report, if required in the individual site plans.

A2. Fish passage will be provided for all life stages when sufficient flows are available, per individual Site Plan Agreement descriptions.

A3. Contact NMFS and CDFW at least five (5) days before installing any dam or instream structure that could result in stranding of fish, or before changing the operation of any existing dam or instream structure that could result in stranding of fish. The types of activities that typically could result in stranding include rapid drawdown of flow or dewatering of the stream channel downstream of the diversion or within diversion ditches between the point of diversion, fish screen and bypass return flow channel.

A4. Construct, operate, maintain, and remove push-up and other temporary dams as described in the Agreement. Push-up dam or weir construction activities shall commence no earlier than May 1 and no later than November 1. Participant may commence push-up dam construction activities prior to May 1 if (a) permittee notifies NMFS and CDFW at least seven (7) days in advance of any dam construction proposed to occur prior to May 1, (b) a survey is completed by NMFS,CDFW or a mutually agreed-upon qualified biologist sufficient to determine the presence and distribution of any Covered Species, and (c) a determination by NMFS and CDFW whether and when the activity may proceed.

A5. Routine push-up dam construction and removal will be accomplished by the operation of a bucket attached to a excavator, or backhoe that is situated outside of the wetted portion of the stream channel. Participant will check and maintain vehicles used for push-up dam construction and removal on a daily basis during the construction and removal activities to prevent leaks of materials that could be deleterious to aquatic life, wildlife, or riparian habitat; minimize disturbance to the stream bed and bank and keep turbidity of the water to a level that is not deleterious to aquatic life; and allow the work area to “rest” to allow the water to clear after any activity that causes a plume of turbidity above background levels, resuming work only after the stream has reached the original background turbidity levels.

2.A Monitoring Protocols for Implementation

All maintenance of instream diversion structures shall be monitored as follows:

- Log of what in-water work had occurred and what minimization measures were implemented will be included in the Annual SHA report
- Data from measuring devices will be included in the annual SHA report, if required in the individual site plans.
- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch
  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
  · Directional orientation of photos
  · Map scale and North marker

- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc)

3. Irrigation Management and Maintenance

This Routine Land and Water Use Activity includes management and maintenance of conveyance facilities on enrolled properties that are used for diverting surface waters including piping/buried mainline, buried mainline with risers, gated pipe, sprinkler systems, open ditches, sumps, storage ponds and tailwater capture ponds/sumps. The activities associated with irrigation management and maintenance may include; head gate on/off operation, moving sprinklers, turning risers on and off, board or tarp removal/placement in ditches, pump, ditch and pond maintenance, pipe clearing/cleaning, maintenance of fish screens, operations of tailwater collection (pick-up ditches and ponds), storing water and irrigation runoff (tailwater production) and general diversion of water per the Shasta River Decree.

Irrigation maintenance activities frequently require the use of heavy equipment. At times this requires equipment and vehicles to cross flowing streams or intermittent channels and/or the construction of stream crossings at designated locations where potential spawning gravels, incubating eggs, and fry are not present based on repeated site specific surveys. Vehicle wet crossings are described in more detail below.

Irrigation management and maintenance also includes operation and maintenance of all types of fish screens. Types of screens include self-cleaning screens, including flat plate self-cleaning screens, and other self-cleaning designs, including, but not limited to, rotary drum screens and cone screens, with a variety of cleaning mechanisms. These screens are designed to continuously clean the screen surface. Periodic maintenance may be needed to remove siltation, debris, sedimentation and anything else that could inhibit normal operation, which would require lifting the screen and using heavy equipment to remove sedimentation/debris. The screens also require regular greasing of bearing and other mechanical parts. Non-self cleaning screens, including tubular, box, and other screen designs consistent with NMFS and CDFW screening criteria are generally cleared daily to remove aquatic vegetation and debris, which is usually done by hand.

<u>The following AMMs may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements)</u>:

B1. During regular maintenance work at diversions and fish screens, the permittee will minimize the discharge of sediments, debris, fine organic matter, and/or muddy, turbid, or silt-laden waters into natural waterways. The permittee will clean instream structures as necessary to maintain proper function.

B2. The permittee will regularly inspect all fish screens and bypass pipes or channels to verify that they are effectively protecting salmonids and other fish species in accordance with CDFW

and NMFS fish screening criteria. When necessary, the permittee will clean and repair all fish screens and bypass pipes or channels. If a fish screen is removed for cleaning or repair and in channel work is necessary, the permittee will ensure either that a replacement screen is installed immediately or water is not flowing through the area where the screen is removed by either implementing isolation or dewatering of the work site in coordination with the fish relocation effort described later in this document.

B3. When a bypass pipe is present, the bypass entrance(s) shall be installed and operated such that all life stages of the Covered Species can easily locate and enter them. All components of the bypass system, from entrance to outfall, shall be designed and operated to minimize the potential for debris blockage and must be sized to accommodate all life stages of fish and aquatic species which may be drawn into the diversion. Sufficient flow (site specifically determined depending on the volume and type of bypass structure) will be supplied from the diversion into a fish bypass to safely and efficiently return fish back to the stream. Bypass outfalls shall be designed and located so that there is sufficient depth and velocity to avoid injury to all life stages of fish and aquatic life which may be directed into a bypass pipe.

B4. When cleaning/maintaining irrigation or drainage ditches or ponds, the permittee will work when the ditch is as dry as possible to minimize or eliminate surface water turbidity and sediment transport. The permittee will place sediment and organic materials excavated from ditches or ponds in a location where the materials cannot wash into any stream channel or Covered Species habitat.

B5. Permittee will regularly monitor and repair as necessary any earthworks or facilities designed to minimize tailwater entering natural waterways.

B6. Planned Instream work shall occur only when Covered Species are least likely to be present or affected by the project; between June 15 and November 1, or as approved by NMFS and CDFW.

B7. In the case where the fish screen is down ditch, the Permittee shall notify CDFW at least 5 days prior to closing a headgate or valve when fish stranding may occur in the diversion conduit, to allow fish rescue notification and coordination by qualified individuals, NMFS and CDFW or otherwise mutually agreed upon individuals.

B8. Water releases from off-channel impoundments, ponds, and tailwater basins will be conducted in a manner that minimizes turbidity, siltation, elevated temperatures, or pollution impacts to waterways supporting Covered Species. Water shall be released in the early morning (prior to 10:00 am) and/or during cool times of the year, and will be released as gradually as possible to minimize fine sediment discharges. If the release timing and rate is not feasible, landowner will contact NMFS and CDFW prior to release.

B9. When permittee is diverting water under the rotational provision under the decree, the river shall not be dewatered and an agreed upon bypass amount will always be provided, as stipulated under the reach wide flow management plans and/or the permittee's individual site plans.

3.B Monitoring Protocols for Implementation

All relevant maintenance of irrigation facilities shall be monitored. Following are some examples of protocols, however, property-specific methods are described in Site Plan Agreements:

- Log of maintenance activities carried out within the calendar year will be included in the yearly SHA report.

4. Pasture Grazing and Riparian Grazing Management

Pasture grazing management includes the movement of cattle between pastures, as well as harrowing, mowing, and haying of pastures. Riparian grazing management includes cattle grazing within riparian areas according to a riparian grazing management plan that is part of a permittee's Site Plan Agreement. Riparian grazing management plans have been developed cooperatively with University of California (UC) Cooperative Extension or other range management specialists.

The following AMMs may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements):

C1. Develop riparian grazing management plans in coordination with UC Cooperative Extension or other range management specialists.

C2. Fenced riparian areas may be grazed in accordance with grazing management plans approved by the Parties. The grazing management plan will address standard grazing management principles, such as the seasonal timing, duration, and intensity (number of livestock allowable per unit area [i.e., stocking rate]), of livestock grazing within the riparian zone and will explain how the proposed management plan will result in improved riparian function and enhanced aquatic habitat. In addition, the grazing plan will describe the means by which the flash grazing will avoid and minimize impacts to streambanks, riparian vegetation, spawning and rearing areas, and avoid direct impacts to spawning and rearing coho salmon.

C3. To avoid direct impacts to Covered Species spawning, incubation, and emergence, grazing in riparian pastures with streams that are accessible to the Covered Species will be allowed from May 1 to November 1 or as approved by NMFS and CDFW. The permittee will perform at least one of the following actions prior to grazing livestock in riparian pastures where livestock could enter a stream between November 1 and May 9:

- Obtain written concurrence from NMFS and CDFW that potential Covered Species spawning habitat does not occur adjacent to the riparian pasture.
- If potential spawning habitat occurs adjacent to the riparian pasture, perform weekly redd surveys between November 1 and January 15. Redd surveys may be performed by NMFS, CDFW, or a qualified biologist. If surveys are performed by a non-agency biologist, written survey results will be provided to NMFS and CDFW for concurrence prior to grazing. If redds are not detected during the redd surveys, riparian grazing may occur in conformance with the Participant's riparian grazing management plan.
- If redds are determined to be present, livestock may graze within the riparian pasture between November 1 and April 30 if a temporary electric exclusion fence or wire is

installed between the riparian pasture and the stream bank, and provisions are made to supply off-channel stockwater. The electric fence must be checked and maintained daily.

4.A Monitoring Protocols

Riparian grazing management shall be monitored as follows:

- Three to five permanent photo point stations will be established and marked at locations within each riparian pasture designed to show both vegetation changes before and after seasonal grazing activities, and long-term trends. Digital photographs will be taken at each photo point station once per year for trend monitoring, and before and after riparian pasture grazing takes place for annual implementation reporting. Permittee will provide a Photo Point monitoring map which includes:
  - Points showing the exact location of each photo monitoring point on the ranch
  - Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
  - Directional orientation of photos
  - Map scale and North marker
  - Landmarks such as labeled road crossings and waterways.

  Permittee will also provide a photo log which includes:

  - Site code
  - Photo's code (digital label)
  - Date photos were taken
  - Description of what was being documented (riparian growth, project implementation, etc.)

- Maintain a log of grazing activities carried out within the calendar year and include in the yearly Site Plan monitoring report. At a minimum, the log will include the following information: beginning and end dates of riparian pasture grazing; number of animals, monitoring practices during the riparian grazing period, and management actions taken as a result of monitoring results including management cues used to determine the time to move livestock out of the riparian pasture.
- NMFS and CDFW may initiate periodic inspection of grazed riparian pastures to ensure riparian grazing management plan is effective.
- NMFS, CDFW, or a qualified party, approved by NMFS and CDFW, may conduct redd surveys to determine the need for livestock restrictions in streams. In the event surveys indicate redds are not present, then livestock access will follow the procedures described in riparian grazing management plan.

5. Fence Maintenance

Fence maintenance includes installation, construction, maintenance, and removal of fencing material, including mesh field fence, panels, or other designed fence barriers, within riparian areas for riparian zone protection, stream crossings and stock-water access.

The following AMMs may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements):

D1. Inspect riparian exclusion fencing during and after each season of grazing and after high flow events where over bank flows may inundate fences and prior to and after riparian grazing has occurred. If riparian exclusion fencing is damaged, repair fencing and move livestock, as appropriate, to minimize resource impacts. If cattle are present, riparian fences shall be repaired within 30 days.

D2. If riparian fences are lost due to a catastrophic event, the permittee shall notify agencies of the loss in the annual report. The permittee will repair up to the percentage of fencing they committed to replace in the Individual Site Plan, and request funding assistance for the remaining repairs beyond the percentage of its commitment. Cattle shall not have access to areas of riparian areas normally excluded through other provisions of the AMM's.

5.A. Monitoring Protocols

All maintenance of riparian fencing shall be monitored as follows:

- A short description of fence maintenance activities will be included in the annual report.

6. Road Use and Maintenance

Ranch roads are regularly used to access irrigation facilities, move cattle and equipment. Roads may be secondary, which are infrequently used or only utilized by cattle and ATVs, or primary, which are roads used more regularly by trucks and heavy equipment. This category is for both the use and the regular maintenance of all ranch roads, which could include grading, rocking, laying base, and culvert replacement.

The following avoidance and minimization measures may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements):

E1. Ensure fish passage at road crossings of streams that are accessible to the Covered Species including at bridges, wet crossings and culverts. Any instream crossing structure will be designed and implemented in accordance with the fish passage evaluation methods specified in the 2010 4th edition of the Department's California Salmonid Stream Habitat Restoration Manual. The most current edition of the manual is available at: http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp.

E2. Minimize erosion and sedimentation from roads and road work. Rock road crossings and approaches to stream channels to minimize sedimentation. Utilize mulch or other suitable materials, as necessary, to minimize sediment runoff and transport to surface waters. Apply mulch so that not less than 90% of the disturbed areas are covered. Apply all mulches, except hydro-mulch, in a layer not less than two (2) inches deep. Where appropriate, all mulches shall be kneaded or tracked-in with track marks parallel to the contour, and tracked as necessary to prevent excessive movement. All exposed soils and fills, including the downstream face of the road prism adjacent to the outlet of culverts, will be reseeded with non-invasive species at a rate

which will ensure establishment.

E3. Planned Instream work shall occur only when Covered Species are least likely to be present or affected by the project, typically from June 15 through November 1.

E.4 Avoid using native surface roads for heavy traffic during wet or thaw periods, and roads not designed and constructed for these conditions. Evaluate the future needs for a road and close roads that will not be needed. Inspect roads annually to determine the need for structural maintenance. Conduct maintenance practices, when conditions warrant, including cleaning and replacement of deteriorated structures and erosion controls, grading or upgrading road surfaces with aggregate. Properly maintain permanent stream crossings and associated fills and approaches to reduce the likelihood (a) that stream overflow will divert onto roads, and (b) that fill erosion will not occur if the drainage structures become obstructed

Monitoring Protocols

All maintenance of roads that have an impact on water ways shall be monitored as follows:

- A short description of annual road maintenance activities will be included in the annual report.

7. Livestock and Vehicle Wet Crossings

This category includes use of wet crossings, which are only allowed where the Covered Species is absent. This activity includes moving livestock, vehicles, ATVs, and equipment across flowing streams or intermittent channels, stock water access, and/or the construction, maintenance, and use of stream crossings at designated locations where potential Covered Species spawning gravels, incubating eggs, and fry are not present based on repeated site specific surveys by agencies or qualified biologists . The crossing may need yearly maintenance to remove debris and place new rock to reinforce an existing crossing.

<u>The following avoidance and minimization measures may be applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements)</u>:

F1. Cross livestock and vehicles only at stable designated locations where potential spawning gravel, incubating eggs, and fry are not present. Wet crossings for cattle should be armored with rock. Fencing should be installed to guide the cattle to the crossing and across the stream on the armored surface while minimizing impacts to the stream and stream banks.

- Factors considered when selecting a crossing location include the stream gradient, channel width, and the ability to maintain the existing channel slope. Generally, to construct a crossing, a boulder weir is placed on the downstream side of the crossing and angular quarry rock is placed in the crossing location; the width of the crossing does not exceed 25 feet; the crossing spans the entire width of the channel; the crossing is “keyed” into the bank on each side; the approaches on both sides do not exceed a slope of 3:1; and bank armoring (usually using quarry rock) is added where needed.
- Angular rock will be applied to the crossing during the period of June 15 through November 1 and maintained over time. The diameter of angular rock will be selected so as to eliminate the risk of angular rock becoming a grade control affecting channel conditions. In locations where the stream crossings occur on intermittent streams,

application of rock shall occur when the stream channel is dry.
- Once a crossing is established, the landowner will corroborate with agency staff after high flow events and/or after gravel introduction, to inspect the crossing and ensure it. has not been compromised. The inspection shall be completed in spring or early summer.

F2. When operating vehicles in wetted portions of a stream channel, check and maintain vehicles on a daily basis to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life, wildlife, or riparian habitat; minimize the number of passes through the stream to avoid increasing the turbidity of the water to a level that is deleterious to aquatic life; and allow the work area to "rest" after each individual pass of the vehicle that causes a plume of turbidity above background levels, resuming work only after the stream has reached the original background turbidity levels.

7.A. Monitoring Protocols

All maintenance activities related to livestock and vehicle crossing shall be monitored as follows:

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

  3. Photo log which includes:

  · Site code

  · Photo's code (digital label)

  · Date photos were taken

  · Description of what was being documented (riparian growth, project implementation, etc.)

8. Herbicide (Weed Management), Fertilizer and Pesticide Use

This category includes weed management, in the form of livestock grazing, use of California legal weed spray products, manual removal, burning, and mowing.

The following AMMs are applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements).

G1. Ensure that any pesticide or herbicide is handled and applied by a licensed applicator (when required) in accordance with all applicable, federal, state, local laws, regulations, procedures, and guidelines. Application of pesticides will be in conformance with the pesticide label as well as any required buffers from anadromous streams. The permittees will apply herbicides/pesticides, if any, in conformance with the applicable label directions, as well as any required buffers from anadromous streams in

conformance with the Order entered in Washington Toxics Coalition et al. v. Environmental Protection Agency et al., (W.D. Wash No. C01-132C) (January 22, 2004). When possible, areas will be spot treated to reduce the amount applied. Use of broad spectrum insecticides will be minimized or avoided as they are more likely to be harmful to non-target organisms including fish and aquatic insects if exposed. Chemicals with the lowest possible toxicity rating will be used when possible. Use of mobile, pre-emergent herbicides will be minimized or avoided as they can impact non-target plants in the riparian area leading to other impacts such as sedimentation. The Applicant will avoid or minimize exposing aquatic resources by managing

spray drift. This includes using modern spray equipment (e.g., low volume or electrostatic sprayers); routinely checking for nozzle wear and calibrating the sprayer frequently throughout the growing season; turning off the sprayer along creeks, drainages and in the turn-around areas; supervising the spraying to minimize effects to surface waters.

G2. Use care to minimize fertilizer use in applications that could result in nutrient loading to natural waterways.

G3. Review label information and avoid the use of any material known to be detrimental to fish where it could impact Covered Species.

G4. Use or store stationary petroleum-powered equipment in a manner to prevent the potential release of petroleum materials into natural waterways by use of drip pans or other measures.

G5. Refuel machinery and handle or store hazardous materials no less than one hundred and fifty (150) feet away from the edge of any water body. All unused or leftover materials will be transported off-site and properly disposed of, when applicable.

8.A. Monitoring Protocols

Herbicide, Fertilizer and Pesticide use shall be monitored as follows:

- Log of herbicide, fertilizer and pesticide use activities carried out within the calendar year to be included in the annual report.

9. Flood or Emergency Events

This category includes immediate work needed to prevent loss of or damage to property from emergencies, including flood, fire, storm, earthquake or other unexpected natural events. Activities may include sediment and debris removal, emergency fish screen repairs, fencing repairs, streambank or crossing stabilization and moving livestock or equipment across streams during emergencies. Emergency is defined in California Code of Regulations section 15359.

The following AMMs are applicable to the activities described above (specific AMMs for each enrolled property will be listed, as appropriate, in individual Site Plan Agreements):

H1: Prior to, during or immediately after the event, NMFS and CDFW will be contacted and AMMs will be developed in coordination with the permittee for the particular flood or emergency circumstances.

H2: NMFS and CDFW will be notified within 14 days of beginning emergency work per Fish and Game Code 1610.

9.A. Monitoring Protocols

All flood repair shall be monitored as follows:

- Photographs of the emergency site repairs and a detailed description of the repairs to be included in the annual report.

10. Beneficial Management Activities

The primary objective of the Template SHA and Site Plan Agreements is to enhance, restore, or maintain habitat to benefit the Covered Species. To accomplish this, the Parties will implement BMAs (the types of actions to be implemented will vary with each Site Plan) that will result in improved habitat conditions for the Covered Species. Habitat restoration projects authorized under the Template SHA will be designed and implemented consistent with techniques and minimization measures presented in CDFG's *California Salmonid Stream Habitat Restoration Manual, Third Edition, Volume II* with four chapters *(Part IX: Fish Passage Evaluation at Stream Crossings, Part X: Upslope Assessment and Restoration Practices, Part XI: Riparian Habitat Restoration, and Part XII: Fish Passage Design and Implementation)* added in 2003, 2004, and 2009, respectively (Flosi et al. 1998, hereafter referred to as CDFG Manual). The Template SHA requires AMMs for all projects to avoid or minimize adverse effects to the Covered Species and habitat.

Individual Site Plan Agreements will include property-specific BMAs that will be implemented on an enrolled property, and the monitoring protocol that will be implemented for each BMA. Project design and implementation of BMAs will include the AMMs provided below. Table 1 lists the entire suite of potential BMAs that could be implemented under the Template SHA on a given property and the type of monitoring that will be associated with each BMA. If grant funds are obtained to implement a given BMA on an enrolled property, data collection and reporting will be required to satisfy the grant contract obligations. Implementation monitoring of BMA's, as described below will be used to inform the Parties and to confirm that each BMA has been constructed as intended, without any structural changes or omissions that would compromise the integrity of the project or reduce it's intended benefits.

Table 1. Beneficial Management Activities and Associated Monitoring Techniques.

Beneficial Management Activity	**Monitoring Techniques**
Barrier Modification and Fish Passage Improvement	Photo monitoring, as-built surveys

Fish Screen Installation or Replacement	Photo monitoring, screening criteria compliance monitoring
Instream Habitat Structures and Improvements	Photo monitoring, as-built surveys
Riparian Habitat Restoration, Bioengineering and Fencing	Photo monitoring, transects, survival monitoring
Off-channel and Side-channel restoration	Photo monitoring, as-built surveys
Road and Trail Erosion Control	Photo monitoring
Water Conservation Measures*	Photo monitoring, SB88 compliant diversion monitoring

*includes Water Exchange and Efficiency Measures, Tailwater Management and Collection Ponds, Irrigation Management, Water Storage Tanks, Piping Ditches and Loss Evaluation, Sprinkler/Pressurized Irrigation, Head gates and Water Measuring Devices)

11. Instream Habitat Structures and Improvements

Instream habitat structures and improvements are intended to provide predator escape and resting cover, increase spawning habitat, improve migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Specific techniques for instream habitat improvement may include:

- placement of large woody debris (LWD) scour and cover structures, log weirs, upsurge weirs, single and opposing log-wing-deflectors, engineered log jams, Hewitt ramps, divide logs, digger logs, spider logs; and log, root wad, and boulder combinations),
- boulder structures (boulder weirs, vortex boulder weirs, boulder clusters, and single and opposing boulder-wing-deflectors),
- install post-assisted wood structures (PAWS) or beaver dam analog structures (BDAS) to increase rearing habitat, and placement of imported spawning gravel. Implementation of these types of projects may require the use of heavy equipment (e.g., self-propelled logging yarders, excavators, backhoes, helicopters), however, hand labor will be used when possible. Projects will include both anchored and unanchored logs, depending on site conditions and wood availability.

11.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report upon completion of the habitat structures that can clearly document changes over time. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

- Points showing the exact location of each photo monitoring point on the ranch
- Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
- Directional orientation of photos
- Map scale and North marker
- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

12. Beaver Management

Two of the most common undesirable impacts to ranching activities that are caused by beavers include cutting of trees and flooding of properties or facilities important to the routine agricultural activities that occur on the property. Potential non-lethal measures that may be considered to mitigate for unwanted tree cutting in critical locations include the installation of wire mesh cages or the application of paint and sand mix at the base of trees in need of protection. Where the construction of beaver dams has raised the water level to cause unwanted flooding of ranch infrastructure, landowners should consider installation of pond levelers or Clemson levelers as described Chapter 9 of The Beaver Restoration Guidebook (Pollock et al. 2015). If it is determined that implementation of the measures described in the Beaver Restoration Guidebook would not alleviate the impacts to agricultural activities caused by beaver dam construction, then the landowner is permitted to modify the structure and discourage future beavers from utilizing the site once NMFS and CDFW have assessed the situation and agree on the extent of dam modification.

12.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  - Points showing the exact location of each photo monitoring point on the ranch
  - Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
  - Directional orientation of photos

- Map scale and North marker
- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

13. Barrier Modification for Fish Passage Improvement

Barrier modification projects are intended to improve passage for the Covered Species by (1) providing access to upstream habitat, and (2) increasing the duration of accessibility (both within and between years). Projects may include those that improve Covered Species passage through beaver dams, existing culverts, diversions, dams, bridges, and paved and unpaved fords through replacement, removal, or retrofitting. In particular, these practices may include the use of gradient control weirs upstream or downstream of barriers to control water velocity, water surface elevation, or provide sufficient pool habitat to facilitate jumps, or interior baffles or weirs to mediate velocity and the increased water depth. BMAs also include log jam and beaver dam modifications to facilitate passage by juvenile and adult life stages of the Covered Species. Implementing these types of projects may require the use of heavy equipment (*e.g.*, self-propelled logging yarders, mechanical excavators, backhoes), however, hand labor will be used wherever possible.

The chapter in the CDFG Manual (Part XII), entitled *Fish Passage Design and Implementation, (Flosi et al., 1998)* provides technical guidance for the design of Covered Species passage projects at stream crossings, small dams and water diversion structures and should be referenced when developing Covered Species passage remediation projects. Part XII is intended to "guide designers through the general process of selecting a design approach for passage improvement. Where there is further opportunity to protect the Covered Species, additional site-specific criteria may be appropriate and recommended by agencies.

13.A. Monitoring Protocols

All Covered Species passage projects shall be monitored using the following protocols:

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  - Points showing the exact location of each photo monitoring point on the ranch

- Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
- Directional orientation of photos
- Map scale and North marker
- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

- The NOAA Restoration Center's Fish Passage Barrier Removal Performance Measures and Monitoring Worksheet which includes longitudinal profiles, cross sections and socio/economic information. http://www.habitat.noaa.gov/toolkits/restoration_center_toolkits/forms_and_guidance_documents/ori_monitoring_sheet_w_guidance.pdf

14. Bioengineering and Riparian Habitat Restoration

These projects are intended to improve Covered Species habitat through increased stream shading that is intended to lower stream temperatures, increase future recruitment of LWD to streams, and increase bank stability and invertebrate production. Riparian habitat restoration projects will aid in the restoration of riparian habitat by increasing the number of plants and plant groupings, and will include the following types of projects: natural regeneration, livestock exclusion fencing, bioengineering, and revegetation. Part XI of the CDFG Manual (Flosi et al., 1998), *Riparian Habitat Restoration,* contains examples of these techniques and should be referenced when planning riparian projects. Reduction of instream fine sediment will improve Covered Species habitat and Covered Species survival by increasing fish embryo and alevin survival in spawning gravels, reducing injury to juveniles from high concentrations of suspended sediment, and minimizing the loss of, or reduction in size of, pools from excess sediment deposition.

The proposed activities will reduce stream sedimentation from bank erosion by stabilizing stream banks with appropriate site-specific techniques including: boulder-streambank stabilization structures, log-streambank stabilization structures, tree revetment, native plant material revetment, willow wall revetment, willow siltation baffles, brush mattresses, check dams, brush check dams, water bars, and exclusion fencing.

Guidelines for stream bank stabilization techniques are described in Part VII of the CDFG Manual, *Project Implementation*. These types of projects usually require the use of heavy equipment but hand labor will be used where ever possible.

14.A. Monitoring Protocols

- CDFW Quantitative Effectiveness Monitoring of Bank Stabilization and Riparian Vegetation Restoration, 2007. Reports on field testing specific protocols for bank stabilization and riparian vegetation restoration. http://cesonoma.ucanr.edu/files/27283.pdf
- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

  3. Photo log which includes:

  · Site code

  · Photo's code (digital label)

  · Date photos were taken

  · Description of what was being documented (riparian growth, project implementation, etc.)

15. Removal of Small Dams (permanent and flashboard)

The CDFG Manual does not cover the removal of small dams, however guidelines and minimization measures have been developed here. Types of small dams included here are permanent, flash board, and seasonal dams with the characteristics listed below. Implementing these types of projects may require the use of heavy equipment (*e.g.*, mechanical excavators, backhoes, etc.). Dams removed in part or in whole, by the use of explosives are not included as a BMA. Dams included here are less than 25 feet in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, or from the lowest elevation of the outside limit of the barrier to the maximum possible water storage elevation. In addition, BMAs will only include dam removal that will result in the formation of a channel at natural grade and shape upstream of the dam, naturally or with excavation, in order to minimize negative effects on downstream habitat. Candidate dam removal projects will (1) have a relatively small volume of sediment available for release, that when released by storm flows, will have minimal effects on downstream habitat, or (2) are designed to remove sediment trapped by the dam down to the elevation of the target thalweg including design channel and floodplain dimensions. This can be accomplished by estimating the natural thalweg using an adequate longitudinal profile (CDFG Manual Part XII *Fish Passage Design and Implementation*) and designing a natural shaped channel that provides the same hydraulic conditions and habitat for the Covered Species that is provided by the natural channel and has the capacity to accommodate flows up to a 2-year

flood.

Data Requirements and Analysis

- A longitudinal profile of the stream channel thalweg for at least a distance equal to 20 channel widths upstream and downstream of the structure and long enough to establish the natural channel grade, whichever is farther, shall be used to determine the potential for channel degradation (as described in the CDFW Manual).
- A minimum of five cross-sections: one downstream of the structure, three roughly evenly spaced through the reservoir area upstream of the structure, and one upstream of the reservoir area outside of the influence of the structure to characterize the channel morphology and quantify the stored sediment.
- Sediment characterization within the reservoir and within a reference reach of a similar channel to determine the proportion of coarse sediment (>2mm) in the reservoir area and target sediment composition.
- Prior to project initiation, further consultations with CDFW and NMFS will be required prior to removing a small dam to determine if: (1) sediments stored behind dam have a reasonable potential to contain environmental contaminants [dioxins, chlorinated pesticides, polychlorinated biphenyls (PCB's), or mercury] beyond the freshwater probable effect levels (PELs) summarized in the NMFS Screening Quick Reference Table guidelines or (2) the risk of significant loss or degradation of downstream spawning or rearing areas by sediment deposition is high. Sites shall be considered to have a reasonable potential to contain contaminants of concern if they are downstream of historical contamination sources such as lumber or paper mills, industrial sites, or intensive agricultural production going back several decades (*i.e.*, since chlorinated pesticides were legal to purchase and use). In these cases, preliminary sediment sampling is advisable.

15.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

  3. Photo log which includes:

  · Site code

  · Photo's code (digital label)

- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

- The NOAA Restoration Center's Fish Passage Barrier Removal Performance Measures and Monitoring Worksheet which includes longitudinal profiles, cross sections and socio/economic information. http://www.habitat.noaa.gov/toolkits/restoration_center_toolkits/forms_and_guidance_documents/ori_monitoring_sheet_w_guidance.pdf

16. Creation of Off-channel/Side Channel Habitat

The creation of off-channel or side channel habitat is not included in the CDFG Manual however, guidelines and minimization measures have been developed for this BMA. Types of side channel or off-channel restoration projects that are eligible as a BMA under the Template SHA are:

- Connection of abandoned side channel or pond habitats to restore Covered Species access
- Connection of adjacent ponds
- Connection of oxbow lakes on floodplains that have been isolated from the meandering
- Channel by river management schemes, or channel incision
- Creation of side channel or off-channel habitat with self-sustaining channels
- Creation of alcoves
- Improvement of hydrologic connection between floodplains and main channels

Projects that involve the installation of a flashboard dam, head gate or other mechanical structure are not part of the BMAs under the Template SHA. Off channel ponds constructed under the Template SHA will not be used as a point of water diversion. The use of logs or boulders as stationary water level control structures will be allowed.

Restoration projects in this category may include: removal or breaching of levees and dikes, channel and pond excavation, creating temporary access roads, constructing wood or rock tailwater control structures, and construction of LWD habitat features. Implementation of these types of projects may require the use of heavy equipment (*e.g.*, self-propelled logging yarders, mechanical excavators, backhoes).

Information regarding consideration of water supply (channel flow/overland flow/groundwater), water quality, and reliability; risk of channel change; as well as, channel and hydraulic grade should be considered when developing off channel habitat features. A recommended reference document for designing off channel habitat features can be found in "Section 5.1.2 Side Channel/Off Channel Habitat Restoration in the Washington Department of Fish and Wildlife 2004 Stream Habitat Restoration Guidelines" (Saldi-Caromile, et al. 2004).

16.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:

1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

2. Provide a Photo Point monitoring map which includes:

· Points showing the exact location of each photo monitoring point on the ranch

· Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

· Directional orientation of photos

· Map scale and North marker

· Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

· Site code

· Photo's code (digital label)

· Date photos were taken

· Description of what was being documented (riparian growth, project implementation, etc.)

- Pre- and post-construction and design flow surveys of constructed inlet and outlet structures, including any other critical or controlling hydraulic features.

17. Developing Alternative Stockwater Supply

Many riparian fencing projects will require the development of off-channel watering areas for livestock. These are often ponds that have been excavated and are filled either by rainwater, overland flow, surface diversions or groundwater (either through water table interception or pumping). BMAs under the Template SHA also include small wells with solar pumps, water lines, watering troughs, and piping used to provide ground or surface water to livestock. All pump intakes associated with surface diversions will be screened in accordance with NMFS Southwest Region "Fish Screening Criteria for Salmonids" (NMFS 1997). Stockwater ponds will be located at a distance from the edge of the active channel as to avoid or minimize stranding of juvenile salmonids or channel avulsion during flood events.

12.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

- Directional orientation of photos
- Map scale and North marker
- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

13. Riparian Restoration and Revegetation

This category includes revegetation of riparian areas and other types of restoration that are consistent with the methods specified in the most current edition of the CDFW Salmonid Stream Habitat Restoration Manual, or as otherwise approved in writing by CDFW. The most current edition of the manual is available at www.dfg.ca.gov/fish/resources/**habitatmanual**.asp.

Typically, riparian vegetation is planted within or adjacent to the active channel, and often in or near the wetted channel. Plantings include native herbaceous perennials, emergent species, grasses, trees, and shrubs. Planting methods vary by species, site, and size of material planted, ranging from hand planting to using a backhoe or excavator. For riparian trees, planting densities range from 130 to 300 plantings per acre, depending on the restoration goals (e.g., shading, sediment trapping, and bank stabilization), substrate, soil chemistry and hydrology. Trees and cuttings range in size from small rooted plugs to large diameter pole plantings. When installing pole plantings, heavy equipment may be used to excavate to or below water table depth. Maintenance activities include the occasional use of hand tools, portable pumps, pick-up trucks and/or water trucks in or near the bed, bank, or channel, for irrigation, debris removal, and replanting of restoration sites.

13.A. Monitoring Protocols

- CDFW Quantitative Effectiveness Monitoring of Bank Stabilization and Riparian Vegetation Restoration, 2007. Reports on field testing specific protocols for bank stabilization and riparian vegetation restoration. http://cesonoma.ucanr.edu/files/27283.pdf
- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. Photo point locations will be selected to give a sense of extent of planting and survival. These locations will be likely located along the fence line and revisited yearly, for 5 years, to establish qualitative success rates.
- The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

  2. Provide a Photo Point monitoring map which includes:

- Points showing the exact location of each photo monitoring point on the ranch
- Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
- Directional orientation of photos
- Map scale and North marker
- Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

14. Monitoring and Research

Monitoring and research actions include monitoring required by the Permittee's ESA Section 10 permits, CDFW's 1600 permit and all other regulatory requirements. Other studies and research that landowners will allow to further the understanding of the Shasta River are also included such as studies for riparian survival, Covered Species surveys, habitat improvement, and food availability.

14.A. Monitoring Protocols

- Reports on all monitoring and research done within a reporting year be included in the annual SHA report if author of the research gives consent for inclusion.

15. Water Storage and Tailwater Capture Systems

This BMA addresses water storage that results from storage of water diverted from surface or groundwater sources and tailwater capture (off channel). A water storage facility enables a landowner to use stored water at a later date or when desired. Water storage facilities can have many benefits that go beyond agricultural use including groundwater recharge, and allowing diversion during winter and early spring when instream discharge is ample. Water storage, when paired with reduction of water use later in the season, can be a benefit to the Covered Species.

Tailwater is created in flood irrigation operations as unabsorbed, untranspired, and unevaporated irrigation water that may flow back into the stream. Restoration projects to address tailwater input will include construction of tailwater capture systems (pond, berms or pick up ditches) to intercept tailwater before it enters streams as surface flow. Water held in capture systems, such as a pond, can be reused for future irrigation purposes, therefore reducing the need for additional stream diversions. Tailwater ponds are used primarily during the irrigation season (dry summer months).

A tailwater pond allows a landowner the ability to irrigate between set irrigation cycles (if in an irrigation district). The State Water Board allows for captured water to be put to beneficial use, not used to irrigate ground that may not have been in production in the past or otherwise harm other legal users of water. Tailwater ponds will be located at a distance from the edge of the active channel to avoid causing stranding of juvenile salmonids or channel avulsion during flood events. Tailwater ponds must be combined with a reduction in diversion amounts or be utilized at an existing point of diversion to ensure water allocation is consistent with adjudication. Tailwater berms allow for intercepting tailwater before it enters the stream, but is not able to be reused. Berms allow tailwater to be kept on the fields and percolate into soils and back to the river. These shall be placed in areas where they will not pose any channel pressure in the event of a flood and in areas where soils have high permeability (well-draining) and not be an excessive amount. Tailwater pick up ditches allow the landowner to intercept tailwater and convey it to another place of use to utilize for irrigation, thereby reducing demand for surface water diversion.

15.A. Monitoring Protocols

- Report of amount of water stored or captured and reused where possible.

16. Piping Ditches

Piping projects consist of constructing a pipe to transport irrigation water as an alternative to conveying water in an open ditch, thereby reducing water loss including from evaporation and absorption. A water budget/balance or consumptive use analysis will be completed to determine actual amount of water saved by these projects. The amount determined to be saved will remain in the stream to benefit the Covered Species. These projects must demonstrate that they intend to dedicate the saved water for instream beneficial use, and make progress towards instream dedication through a means mutually agreeable to the permittee and NMFS and CDFW.

16.A. Monitoring Protocols

- Provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:

  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc.).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

· Site code

· Photo's code (digital label)

· Date photos were taken

· Description of what was being documented (riparian growth, project implementation, etc.)

- Real time water diversion monitoring protocol or water measuring protocol that is in concurrence with SB88.

17. Fish Screens

This category includes the installation, operation, and maintenance of the types of fish screens described below, provided they meet the NMFS (1996, 1997) fish screening criteria. Installing a fish screen usually includes site excavation, forming and pouring a concrete foundation and walls, excavation and installation of a fish bypass pipe or channel, and installation of the fish screen structure. Dewatering is often required and could be implemented through coffer dams or sheet piling. Heavy equipment is typically used for excavation of the screen site and bypass. If the fish screen is placed within or near flood prone areas, typically rock or other armoring is installed to protect the screen. Fish screen types include:

- Self-cleaning screens, including flat plate self-cleaning screens, and other self-cleaning designs, including, but not limited to, rotary drum screens and cone screens, with a variety of cleaning mechanisms, consistent with NMFS fish screening criteria (1996, 1997).
- Non-self-cleaning screens, including tubular, box, and other screen designs consistent with NMFS screening criteria (1996, 1997).

17.A. Monitoring Protocols

- In the event the fish screen is installed, repaired, replaced, and/or relocated, <u>provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities.</u> The Permittee will do the following as part of photo point monitoring:
1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc).

2. Provide a Photo Point monitoring map which includes:

· Points showing the exact location of each photo monitoring point on the ranch

· Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

· Directional orientation of photos

· Map scale and North marker

· Landmarks such as labeled road crossings and waterways.

3. Photo log which includes:

· Site code

· Photo's code (digital label)

· Date photos were taken

· Description of what was being documented (riparian growth, project implementation, etc.)

- Pre- and post-construction and design flow surveys of structure and any other critical or controlling hydraulic features.

18. Headgates and Water Measuring Devices

Measuring devices are typically installed with the head gate to allow water users to determine the volume of water diverted. These devices will help diverters ensure that are diverting their legal water right. Head gate designs will be approved by a NMFS or CDFW engineer prior to installation; *provided, however*, that such approval will be deemed to have occurred if an agency fails to take action within 60 days of submission of head gate designs by a permittee to NMFS and CDFW. This category includes the installation and maintenance of stream gages in the active stream channel, usually using pipe 2" or greater in diameter. Typically, the pipe is secured to the bank by notching it into the bank and by then attaching it to the bedrock, a boulder, or a concrete buttress. Generally, heavy equipment is not needed to install and maintain stream gages. Water measuring devices will have the ability to record diversion volumes hourly for points of diversion that have water rights greater than or equal to 1,000 acre feet per year and daily for points of diversion with water rights less than 1,000 acre feet per year. For points of diversion with water rights less than or equal to 10 acre feet per year should be recorded monthly.

18.A. Monitoring Protocols

- In the event a head gate is installed, replaced, repaired, and/or relocated, Permittee will provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc.).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

  3. Photo log which includes:

- Site code
- Photo's code (digital label)
- Date photos were taken
- Description of what was being documented (riparian growth, project implementation, etc.)

- Include the water measuring data as specified in the individual site plan.

19. Optimizing Cold Water Spring Inputs

Cold water springs are an important habitat feature on the Shasta River and can provide both local and reach scale benefits to the Covered Species.. Projects to optimize cold water spring inputs may include developing alcoves (described in the off channel section above), installing spring boxes or piping springs to the river to improve habitat conditions at a specific location. All spring optimization projects will be designed to maintain Covered Species passage, minimize erosion, comply with water laws, and improve, or not impair, water quality conditions. All spring optimization projects will be reviewed and approved by a NMFS/CDFW engineer to ensure that these conditions have been met.

19.A. Monitoring Protocols

- If any infrastructure is constructed to convey spring water to the river the Permittee will provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc.).
  2. Provide a Photo Point monitoring map which includes:
     - Points showing the exact location of each photo monitoring point on the ranch
     - Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)
     - Directional orientation of photos
     - Map scale and North marker
     - Landmarks such as labeled road crossings and waterways.
  3. Photo log which includes:
     - Site code
     - Photo's code (digital label)
     - Date photos were taken
     - Description of what was being documented (riparian growth, project implementation, etc.)
- Temperature Monitoring Protocol as specified in the Individual site plan or in the Flow Management Plan.

- Real time water diversion monitoring protocol as specified in the Individual site plan or in the Flow Management Plan.

20. Combining or Moving Points of Diversion

Combining or moving current points of diversion can be employed as a BMA in order to enhance flows in certain reaches, maintain cold water springs or provide fish passage so long as operations are undertaken in compliance with law. Each permittee shall affirm its operations complies with law if it undertakes operations under this section.

20.A. Monitoring Protocols

- To document the construction of new infrastructure that will facilitate moving a point of diversion or combining diversions the Permittee will provide Photo Monitoring in the Annual SHA report that can clearly document changes over time and/or management activities. The Permittee will do the following as part of photo point monitoring:
  1. Establish, label and re-occupy set photo points, with a permanent marker in view of the photo monitoring point (i.e. fencepost, hillside, large tree, etc.).

  2. Provide a Photo Point monitoring map which includes:

  · Points showing the exact location of each photo monitoring point on the ranch

  · Labels for each photo monitoring point with a site code (Ranch ID/Photo Point #)

  · Directional orientation of photos

  · Map scale and North marker

  · Landmarks such as labeled road crossings and waterways.

  3. Photo log which includes:

  · Site code

  · Photo's code (digital label)

  · Date photos were taken

  · Description of what was being documented (riparian growth, project implementation, etc.)
- Temperature Monitoring Protocol as specified in the Individual site plan or in the Flow Management Plan.
- Real time water diversion monitoring protocol as specified in the Individual site plan or in the Flow Management Plan.

21. Water Exchanges

Water exchanges may be done in certain reaches where additional stream flow can be diverted in lieu of a cold water source. The act of diverting additional water at a point of diversion must not impact bypass flow requirements past that point of diversion or any downstream point. These exchanges must be monitored sufficiently to document the exchanges are of equal

amounts (stream diversion to spring water) to ensure dewatering of the channel is not occurring.

21.A. Monitoring Protocols

- Temperature Monitoring Protocol as specified in an individual Site Plan Agreement or in the Flow Management Plan.
- Real time water diversion monitoring protocol as specified in individual Site Plan Agreement or in the Flow Management Plan.

22. 1707 Dedications

Permittees who divert water under any legal basis of right, including riparian, permitted, and licensed water rights, may petition the State Water Board pursuant to Water Code section 1707 for a "change for purposes of preserving or enhancing wetlands habitat, fish and wildlife resources, or recreation in, or on, the water." The section 1707 petition may be coupled with an application for a water right or a petition to amend an existing permit or license in order to modify an existing project so that diversion will occur in a manner that improves conditions for Covered Species.

22.A. Monitoring Protocols

- Temperature Monitoring Protocol
- Real time water diversion monitoring protocol

Avoidance and Minimization Measures for Beneficial Management Activities

The following general minimization measures, as they apply to particular BMAs, shall be incorporated into Site Plan Agreements authorized under the Template SHA, as appropriate.

1.1 General Protection Measures

- The general construction season shall be from June 15 to November 1st Restoration, construction, fish relocation, and dewatering activities within any wetted or flowing stream channel shall only occur within this period. Revegetation outside of the active channel may continue beyond November 1, if necessary.
- Prior to construction, any contractor shall be provided with the specific protective measures to be followed during implementation of the project. In addition, a qualified biologist shall provide the construction crew with information on the listed species in the project area, the protection afforded the species by the ESA, and guidance on those specific protection measures that must be implemented as part of the project.
- All activities that are likely to result in negative aquatic effects, including temporary effects, shall proceed through a sequencing of effect reduction: avoidance, reduction in magnitude of effect.
- Poured concrete shall be excluded from the wetted channel until the water surrounding the concrete structure has a PH between 6 and 8.5 to avoid water quality issues for Covered Species.
- If the thalweg (location of the deepest and fastest part) of the stream has been altered due to construction activities, efforts shall be undertaken to reestablish it to its original

configuration[2].

1.2 Requirements for Covered Species Relocation and Dewatering Activities

1. Guidelines for dewatering. Project activities funded or permitted under the Template SHA may require Covered Species relocation or dewatering activities. Dewatering may not be appropriate for some projects that will result in only minor input of sediment, such as placing logs with hand crews, or installing boulder clusters. Dewatering can result in the temporary loss of aquatic habitat, and the stranding, or displacement of Covered Species. Increased turbidity may occur from disturbance of the channel bed. The following guidelines may minimize potential effects for projects that require dewatering of a stream:

- In those specific cases where it is deemed necessary to work in flowing water, the work area shall be isolated and all flowing water shall be temporarily diverted around the work site to maintain downstream flows during construction. Restoration actions such as installing LWD, boulder structures or spawning gravel, where heavy equipment does not enter the stream and can operate from the streambank, do not need to occur in a dewatered stream channel.
- Exclude Covered Species from occupying the work area by blocking the stream channel above and below the work area with fine-meshed net or screens. Mesh will be no greater than 1/8 inch diameter. The bottom of a seine must be completely secured to the channel bed. Screens must be checked twice daily and cleaned of debris to permit free flow of water. Block nets shall be placed and maintained throughout the dewatering period at the upper and lower extent of the areas where Covered Species will be removed. Block net mesh shall be sized to ensure Covered Species upstream or downstream do not enter the areas proposed for dewatering between passes with the electrofisher or seine.
- Prior to dewatering, determine the best means to bypass flow through the work area to minimize disturbance to the channel and avoid direct mortality of Covered Species and other aquatic vertebrates (as described more fully below under ***General conditions for all Covered Species capture and relocation activities.)***
- Coordinate project site dewatering with a qualified biologist in coordination with NMFS and CDFW to perform Covered Species relocation activities. The qualified biologist(s) must be familiar with the life history and identification of the Covered Species within the action area.
- Prior to dewatering a construction site, qualified individuals will capture and relocate Covered Species and other native fish and amphibians to avoid direct mortality and minimize adverse effects. This is especially important if listed species are present within the project site.
- Minimize the length of the dewatered stream channel and duration of dewatering, to the extent practicable.
- Any temporary dam or other artificial obstruction constructed shall only be built from materials such as sandbags or clean gravel which will cause little or no siltation. Cofferdams should be constructed to minimize water seepage into the construction areas. Coffer dams and stream diversion systems shall remain in place and fully functional throughout the construction period.
- When coffer dams with bypass pipes are installed, debris racks will be placed at the bypass pipe inlet. Bypass pipes will be monitored a minimum of two times per day, seven days a week. All accumulated debris shall be removed.

[2] Projects that may include activities, such the use of willow baffles, which may alter the thalweg are allowed

- Bypass pipes will be sized to not create scour at the outflow and to accommodate the existing streamflow.
- The work area may need to be periodically pumped dry of seepage. Place pumps in flat areas, well away from the stream channel. Secure pumps by tying off to a tree or stake in place to prevent movement by vibration. Refuel in an area well away from the stream channel and place fuel absorbent mats under pump while refueling. Pump intakes shall be covered with 1/8 inch mesh to prevent potential entrainment of Covered Species that failed to be removed. Check intake periodically for impingement of Covered Species.
- If pumping is necessary to dewater the work site, procedures for pumped water shall include requiring a temporary siltation basin for treatment of all water prior to entering any waterway and not allowing oil or other greasy substances originating from operations to enter or be placed where they could enter a wetted channel. Projects will adhere to NMFS Southwest Region *Fish Screening Criteria for Salmonids* (NMFS 1997).
- Discharge sediment-laden water from construction areas to an upland location or settling pond where it will not drain sediment-laden water back to the stream channel.
- When construction is complete, the flow diversion structure shall be removed as soon as possible in a manner that will allow flow to resume with the least disturbance to the substrate. Cofferdams will be removed so surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than one inch per hour. This will minimize the probability of Covered Species stranding as the area upstream becomes dewatered.

2. General conditions for all Covered Species capture and relocation activities:

- Covered Species relocation and dewatering activities shall only occur between June 15 and November 1 of each year.
- All seining, electrofishing, and relocation activities shall be performed by a qualified fisheries biologist. The qualified fisheries biologist shall capture and relocate the Covered Species prior to construction of the water diversion structures (*e.g.,* cofferdams). The qualified fisheries biologist shall note the number of salmonids observed in the affected area, the number and species of salmonids relocated, where they were relocated to, and the date and time of collection and relocation. The qualified fisheries biologist shall have a minimum of three years field experience in the identification and capture of salmonids.. The qualified biologist will adhere to the following requirements for capture and transport of Covered Species:
    1. Determine the most efficient means for capturing Covered Species (*i.e.*, seining, dip netting, trapping, electrofishing). Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, Covered Species may be concentrated by pumping-down the pool and then seining or dipnetting Covered Species.
    2. Notify NMFS and CDFW one week prior to capture and relocation of Covered Species to provide NMFS and CDFW an opportunity to monitor.
    3. Initial Covered Species relocation efforts will be conducted several days prior to the start of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional seining or electrofishing passes immediately prior to construction. In many instances, additional Covered Species will be captured that eluded the previous day's efforts.
    4. In streams with high water temperature, perform relocation activities during morning periods.
- Prior to capturing Covered Species, determine the most appropriate release location(s). Consider the following when selecting release site(s):

1. Similar water temperature as capture location
2. Ample habitat for captured Covered Species
3. Low likelihood of Covered Species reentering work site or becoming impinged on exclusion net or screen.
4. Covered Species must be released in the nearest suitable location within the same stream . If another location is proposed, this will be approved in advance by NMFS or CDFW.

- Periodically measure air and water temperatures. Cease activities when measured water temperatures exceed 18 ºC if Covered Species are present. Temperatures will be measured at the head of riffle tail of pool interface.

3. Electrofishing Guidelines. The following methods shall be used if Covered Species are relocated via electrofishing:

- All electrofishing will be conducted according to NMFS *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act* (2000).
- The backpack electrofisher shall be set as follows when capturing Covered Species:

Voltage setting on the electrofisher shall not exceed 300 volts.

A) Voltage:	100 Volts	300 Volts
B) Duration:	500 µs (microseconds)	5 ms (milliseconds)
C) Frequency:	30 Hertz	70 Hertz

- A minimum of three passes with the electrofisher shall be conducted to ensure maximum capture probability of Covered Species within the area proposed for dewatering.
- No electrofishing shall occur if water conductivity is greater than 350 microSiemens per centimeter (µS/cm) or when instream water temperatures exceed 18 °C. Water temperatures shall be measured at the pool/riffle interface. Direct current (DC) shall be used.
- A minimum of one assistant shall aid the fisheries biologist by netting stunned fish and other aquatic vertebrates.

4. Seining guidelines. The following methods, shall be used if Covered Species are removed with seines.

- A minimum of three passes with the seine shall be utilized to ensure maximum capture probability of Covered Species within the area.
- All captured Covered Species shall be processed and released prior to each subsequent pass with the seine.
- The seine mesh shall be adequately sized to ensure Covered Species are not gilled during capture and relocation activities.

5. Guidelines for relocation of Covered Species. The following methods shall be used during relocation activities associated with either method of capture (electrofishing or seining):

- Covered Species shall not be overcrowded into buckets; allowing approximately six cubic inches per young-of-the-year (0+) individual and more for larger individuals.
- Every effort shall be made not to mix 0+ salmonids with larger salmonids, or other potential predators. Have at least two containers and segregate 0+ age Covered Species from larger age-classes. Place larger amphibians in containers with larger fish.
- Covered Species predators, such as sculpins (*Cottus sp*.) collected and relocated during electrofishing or seining activities shall be relocated so as to not concentrate them in one area. Particular emphasis shall be placed on avoiding relocation of sculpins to relocation sites identified for the Covered Species. To minimize predation on Covered Species, these species shall be distributed throughout the wetted portion of the stream so as not to concentrate them in one area.
- All captured Covered Species shall be relocated, preferably upstream, of the proposed construction project and placed in suitable habitat. Captured Covered Species shall be placed into a pool, preferably with a depth of greater than two feet with available instream cover.
- All captured Covered Species will be processed and released prior to conducting a subsequent electrofishing or seining pass.
- All Covered Species and other native fish captured will be allowed to recover from electrofishing before being returned to the stream.
- Minimize handling of Covered Species. When handling is necessary, always wet hands or nets prior to touching Covered Species. Handlers will not wear DEET based insect repellents.
- Temporarily hold Covered Species in cool, shaded, aerated water in a container with a lid. Provide aeration with a battery-powered external bubbler. Protect Covered Species from jostling and noise and do not remove Covered Species from this container until time of release.
- Place a thermometer in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds 18 °C., Covered Species shall be released and rescue operations ceased.
- In areas where aquatic vertebrates are abundant, periodically cease capture, and release at predetermined locations.
- Visually identify species and estimate year-classes of fishes at time of release. Record the number of Covered Species and other fish captured. Avoid anesthetizing or measuring Covered Species.
- If more than three percent of the Covered Species captured are killed or injured, the project lead shall contact NMFS and CDFW. The purpose of the contact is to allow the agencies a courtesy review of activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities must be retained, placed in an appropriately sized whirl-pak or zip-lock bag, labeled with the date and time of collection, fork length, location of capture, and frozen as soon as possible. Frozen samples must be retained until specific instructions are provided by NMFS.

1.3 Measures to Minimize Disturbance from Instream Habitat Restoration Construction

Measures to minimize disturbance associated with instream habitat restoration construction activities are presented below.

- Construction will only occur between June 15 and November 1.
- Debris, soil, silt, excessive bark, rubbish, creosote-treated wood, raw cement/concrete or

washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil or entering waterways. Any of these materials, placed within or where they may enter a stream or lake, by the applicant or any party working under contract, or with permission of the applicant, shall be removed immediately. During project activities, all trash that may attract potential predators of Covered Species will be properly contained, removed from the work site, and disposed of daily.

- Where feasible, the construction shall occur from the bank, or on a temporary pad underlain with filter fabric.
- Use of heavy equipment shall be minimized in a channel bottom with rocky or cobbled substrate. If access to the work site requires crossing a rocky or cobbled substrate, a rubber tire loader/backhoe is the preferred vehicle. Only after this option has been determined infeasible will the use of tracked vehicles be considered. The amount of time this equipment is stationed, working, or traveling within the creek bed shall be minimized. When heavy equipment is used, woody debris and vegetation on banks and in the channel shall not be disturbed if outside of the project's scope.
- Hydraulic fluids in mechanical equipment working within the stream channel shall not contain organophosphate esters. Vegetable based hydraulic fluids are preferred.
- The use or storage of petroleum-powered equipment shall be accomplished in a manner to prevent the potential release of petroleum materials into waterways.
- Areas for fuel storage, refueling, and servicing of construction equipment must be located in an upland location.
- Prior to use, clean all equipment to remove external oil, grease, dirt, mud and potential invasive species. Wash sites must be located in upland locations so wash water does not flow into a stream channel or adjacent wetlands.
- All construction equipment must be in good working condition, showing no signs of fuel or oil leaks. Prior to construction, all mechanical equipment shall be thoroughly inspected and evaluated for the potential of fluid leakage. All mechanical equipment shall be inspected on a daily basis to ensure there are no motor oil, transmission fluid, hydraulic fluid, or coolant leaks. All leaks shall be repaired in the equipment staging area or other suitable location prior to resumption of construction activity.
- Oil absorbent and spill containment materials shall be located on site when mechanical equipment is in operation with 100 feet of the proposed watercourse crossings. If a spill occurs, no additional work shall commence in-channel until (1) the mechanical equipment is inspected by the contractor, and the leak has been repaired, (2) the spill has been contained, and (3) CDFW and NMFS are contacted and have evaluated the impacts of the spill.

1.4 Measures to Minimize Degradation of Water Quality

Construction or maintenance activities for projects covered under the Template SHA may result in temporary increases in turbidity levels in the stream. The following measures will be implemented to reduce the potential for adverse effects to water quality during and post-construction:

1. General erosion control during construction:

- When appropriate, isolate the construction area from flowing water until project materials are installed and erosion protection is in place.
- Effective erosion control measures shall be in place at all times during construction. Do

not start construction until all temporary control devices (*e.g.*, straw bales with sterile, weed free straw, silt fences*)* are in place downslope or downstream of project site within the riparian area. The devices shall be properly installed at all locations where the likelihood of sediment input exists. These devices shall be in place during and after construction activities for the purposes of minimizing fine sediment and sediment/water slurry input to flowing water and detaining sediment-laden water on site. If continued erosion is likely to occur after construction is complete, then appropriate erosion prevention measures shall be implemented and maintained until erosion has subsided. Erosion control devices such as coir rolls or erosion control blankets will not contain plastic netting of a mesh size that would entrain reptiles (esp. snakes) and amphibians.

- Sediment shall be removed from sediment controls once it has reached one-third of the exposed height of the control. Whenever straw bales are used, they shall be sterile and weed free, staked and dug into the ground 12 cm. Catch basins shall be maintained so that no more than 15 cm of sediment depth accumulates within traps or sumps.
- Sediment-laden water created by construction activity shall be filtered before it leaves the settling pond or enters the stream network or an aquatic resource area.
- The contractor/applicant to the Program is required to inspect, maintain or repair all erosion control devices prior to and after any storm event, at 24 hour intervals during extended storm events, and a minimum of every two weeks until all erosion control measures have been completed.

2. Guidelines for temporary stockpiling:

- Minimize temporary stockpiling of material. Stockpile excavated material in areas where it cannot enter the stream channel. Prior to start of construction, determine if such sites are available at or near the project location. If nearby sites are unavailable, determine location where material will be deposited. Establish locations to deposit spoils well away from watercourses with the potential to deliver sediment into streams supporting, or historically supporting populations of the Covered Species. Spoils shall be contoured to disperse runoff and stabilized with mulch and (native) vegetation. Use devices such as plastic sheeting held down with rocks or sandbags over stockpiles, silt fences, or berms of hay bales, to minimize movement of exposed or stockpiled soils.
- If feasible, conserve topsoil for reuse at project location or use in other areas. End haul spoils away from watercourses as soon as possible to minimize potential sediment delivery.

Pre Rainstorm and Post construction erosion control:

- Prior to a forecasted precipitation event of >½ inch, immediately after project completion and before close of seasonal work window, stabilize all exposed soil with erosion control measures such as mulch, seeding, and/or placement of erosion control blankets. Remove all artificial erosion control devices after the project area has fully stabilized. All exposed soil present in and around the project site shall be stabilized after construction. Erosion control devices such as coir rolls or erosion control blankets will not contain plastic netting of a mesh size that would entrain reptiles (esp. snakes) and amphibians.
- All bare and/or disturbed slopes (> 100 square ft of bare mineral soil) will be treated with erosion control measures such as hay bales, netting, fiber rolls, and hydroseed as permanent erosion control measures.
- Where straw, mulch, or slash is used as erosion control on bare mineral soil, the minimum coverage shall be 95 percent with a minimum depth of two inches.
- When seeding is used as an erosion control measure, only seeds from native plant species

will be used. Sterile (without seeds), weed-free straw, free of exotic weeds, is required when hay or hay bales are used as erosional control measures.

1.5 Measures to Minimize Loss or Disturbance of Riparian Vegetation

Measures to minimize loss or disturbance to riparian vegetation are described below. The revegetation and success criteria that will be adhered to for projects implemented under the Template SHA that result in disturbance to riparian vegetation are also described below.

1. Minimizing disturbance:

- Retain as many trees and brush as feasible, emphasizing shade-producing and bank-stabilizing trees and brush.
- Prior to construction, determine locations and equipment access points that minimize riparian disturbance. Avoid entering unstable areas. Use project designs and access points that minimize riparian disturbance without affecting less stable areas, which may increase the risk of channel instability.
- Minimize soil compaction by using equipment with a greater reach or that exerts less pressure per square inch on the ground than other equipment, resulting in less overall area disturbed or less compaction of disturbed areas.
- If riparian vegetation is to be removed with chainsaws, only use vegetable-based bar oil.

2. Revegetation and success criteria:

- Any stream bank area left barren of vegetation as a result of the implementation or maintenance of the practices shall be restored to a natural state by seeding, planting, or other means with native trees, shrubs, or grasses prior to November 1 of the project year. Barren areas shall typically be planted with a combination of willow stakes, native shrubs and trees and/or erosion control grass mixes.
- Native plant species shall be used for revegetation of disturbed and compacted areas. The species used shall be specific to the Shasta Valley, and comprise a diverse community structure (plantings shall generally include both woody and herbaceous species, in coordination with NMFS and CDFW).
- For projects where re-vegetation is implemented to compensate for riparian vegetation impacted by project construction, a re-vegetation monitoring report will be required after 5 years to document success. Success is defined as 50 percent survival of plantings or 50 percent native ground cover for broadcast planting of seed after a period of 3 years. If revegetation efforts will be passive (*i.e.*, natural regeneration), success will be defined as total cover of woody and herbaceous material equal to or greater than pre-project conditions. If at the end of five years, the vegetation has not successfully been re-established, the project applicant to the Program will be responsible for replacement planting, additional watering, weeding, invasive exotic eradication, or any other practice, to achieve the above success standards. If success is not achieved within the first 5 years, the project applicant will need to prepare a follow-up report in an additional 5 years. This requirement will proceed in 5 year increments until success is achieved.
- All exclusion netting or fencing placed around plantings will be removed after 3 years, or later until plantings are no longer being substantially impacted by livestock or wildlife.

1.6 Measures to Minimize Impact of Roads in the Project Area

Upon the completion of restoration activities, roads within the riparian zone used for implementation of BMAs and AMMs shall be weather proofed according to measures as described in *Handbook for Forest and Ranch Roads* by Weaver and Hagans (1994) of Pacific Watershed Associates and in Part X of the CDFG Manual entitled "*Upslope Assessment and Restoration Practices."* (Flosi et al., 1998). The following are some of the methods that may be applied to roads impacted by project activities implemented under the Template SHA.

- Establish waterbreaks (*e.g.*, waterbars and rolling dips) on all seasonal roads, skid trails, paths, and fire breaks by October 15. Do not remove waterbreaks until May 15.
- Maximum distance between waterbreaks shall not exceed the following standards: (1) 100 feet for road or trail gradients less than 10 percent slope; (2) 75 feet for road or trail gradients from 11 to 25 percent; (3) 50 feet for road or trail gradients from 26 to 50 percent slope; and (4) 50 feet for road or trail gradients greater than 50 percent slope. Depending on site-specific conditions more frequent intervals may be required to prevent road surface rilling and erosion.
- Locate waterbreaks to allow water to be discharged onto some form of vegetative cover, slash, rocks, or less erodible material. Do not discharge waterbreaks onto unconsolidated fill.
- Waterbreaks shall be cut diagonally a minimum of six inches into the firm roadbed, skid trail, or firebreak surface and shall have a continuous firm embankment of at least six inches in height immediately adjacent to the lower edge of the waterbreak cut.
- The maintenance period for waterbreaks and any other erosion control facilities shall occur after every major storm event for the first year after installation.
- Rolling-dips are preferred over waterbars. Waterbars shall only be used on unsurfaced roads where winter use (including use by bikes, horses, and hikers) will not occur.
- After the first year of installation, erosion control facilities shall be inspected for failure prior to the winter period (October 15) after the first major storm event, and prior to the end of the winter period (May 15). If the erosion controls have failed, additional erosion control elements will be installed to the project site.
- Applicant will establish locations to deposit spoils well away from watercourses with the potential to delivery sediment into streams supporting, or historically supporting Covered Species. Spoils shall be contoured to disperse runoff and stabilized with mulch and (native) vegetation.
- No berms are allowed on the outside of the road edge.

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APPENDIX 4: Adaptive Management Program

Adaptive Management Program for the Shasta River Safe Harbor Agreement

1. Introduction

The purpose of the Template Safe Harbor Agreement (the Agreement) and the Site Plan Agreements is to contribute to the recovery of Southern Oregon and Northern California Coast (SONCC) Evolutionarily Significant Unit (ESU) of coho salmon (Covered Species) on non-federal lands in the Shasta River watershed (Figure 1; Covered Area). This will be achieved by Permittees undertaking Beneficial Management Activities (BMAs) that include water conservation projects, water management strategies and in stream habitat enhancement projects. The Permittees have voluntarily agreed to implement BMAs on their enrolled properties as detailed in individual Site Plan Agreements. The National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW) in collaboration with the Technical Advisory Committee (TAC), consisting of landowner, agency, and non-governmental organization representatives, identified a list of existing conditions (e.g., hydrology, water quality, substrate, riparian etc.) in the Covered Area of the Agreement that are known or assumed to be limiting factors.

The Covered Area includes about 20 miles of the Shasta River, the lower 1.6 miles of Big Springs Creek, and the lower 14 miles of Parks Creek. The TAC has identified six different reaches within the Covered Area for which baseline conditions have been qualitatively described. The reaches include the Upper Shasta River from Dwinnell Dam downstream to the confluence of Parks Creek (RM 40.6 to 35), the Mid-Shasta River from the confluence of Parks Creek downstream to the northern boundary of the Covered Area (RM 35 to 20), Big Springs Creek from the confluence with the Shasta River upstream to the water wheel crossing (RM 1.6 to 0), Upper Parks Creek (RM 14.5 to 8), Mid-Parks Creek (RM 8 to 2), and Lower Parks Creek (RM 2 to 0). A map showing the location of reaches is located in Figure 1.

The BMA's identified in the Agreement and Site Plan Agreements are expected to enhance conditions and thus contribute, directly or indirectly, to the recovery of the Covered Species. Implementation Monitoring and Effectiveness Monitoring will be used to evaluate whether the objectives of the Agreement are being achieved over time. This Adaptive Management Plan defines the process for evaluating the results of all monitoring activities, and provides a process for recommending adjustments to management actions within the framework of the Agreement. Any recommended adjustments or changes to BMAs or AMMs that result from evaluation of monitoring results and the Adaptive Management Program would be voluntary.

An Adaptive Management Program is a formal process for continually improving management policies and practices by learning from their outcomes (Taylor et al. 1997). An effective Adaptive Management Program includes a systematic process of steps that transition from one step to the next. These transitions consist of 1) a transition from current knowledge to an adequate time series of data, post-project (or set of projects), (2) an analysis of the time series, (3) inferences regarding the condition of salmon, and (4) decisions regarding future management and monitoring and a mechanism, including a process for implementing changed direction or priorities. The program should contain a set of measurable goals and objectives that allow for hypothesis testing to evaluate the effectiveness of the management actions taken and provide the basis for changes in management approaches in the future.

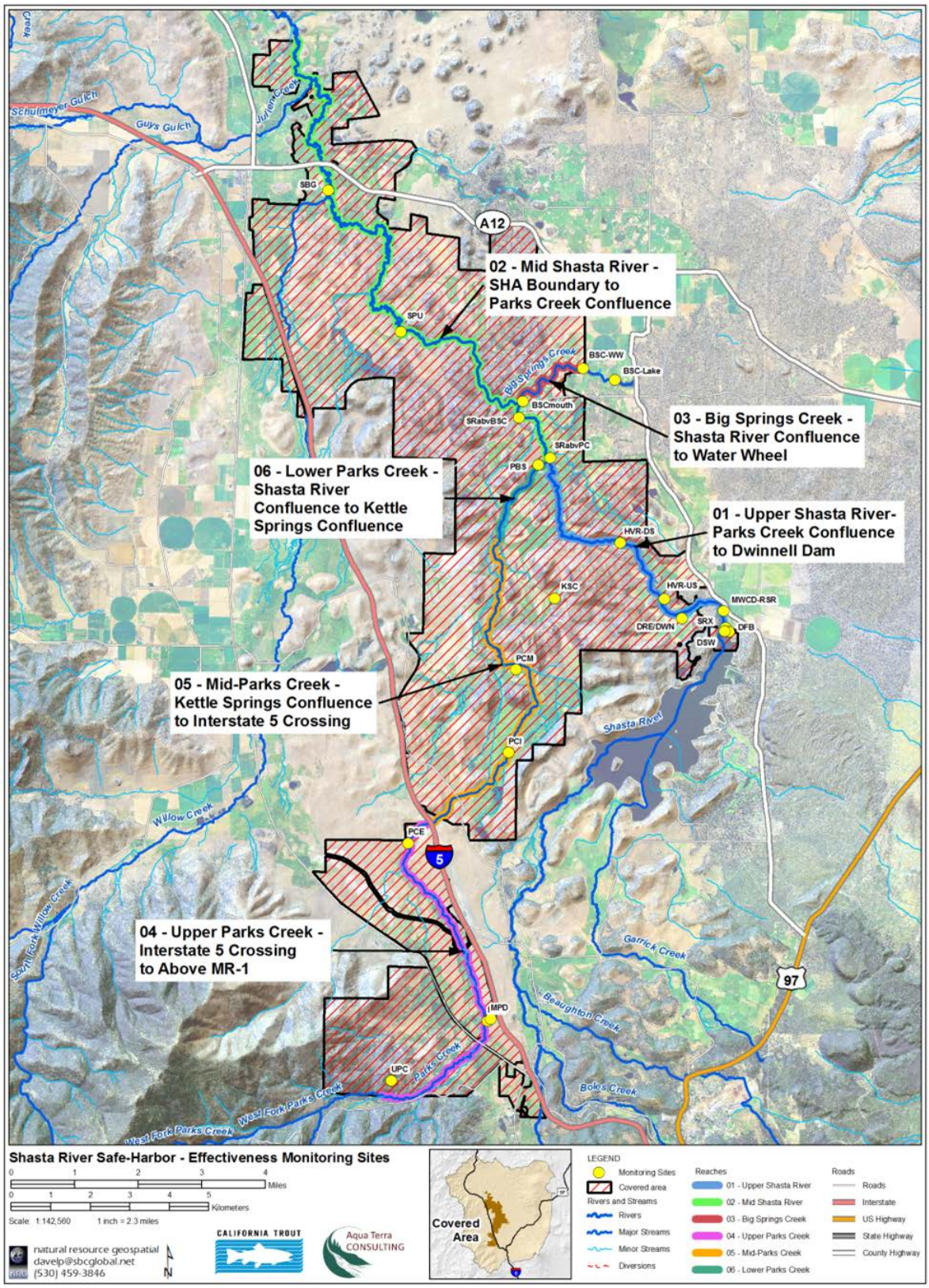

Figure 3. Effectiveness Monitoring Sites.

2. Goals and Objectives of the Safe Harbor Agreement

The goal of the Agreement is to promote the conservation, enhancement of survival, and recovery of coho salmon. The primary factors currently believed to inhibit the recovery of coho salmon in the Covered Area include impaired instream flow and adverse water temperatures, poor spawning substrate quality, poor riparian habitat conditions, a lack of habitat diversity, degraded channel structure, and poor connectivity to off channel habitats (side channels and alcoves) and floodplain features (NMFS 2014). The overall strategy of the Agreement is to implement BMAs and AMMs designed to improve those habitat and water quality parameters that are currently believed to impede recovery of coho salmon. The collective efforts of the Permittees to implement BMAs and AMMs as described in Site Plan Agreements are anticipated to result in site-scale and reach-scale benefits that will, over time, improve conditions and result in an increase in the distribution, abundance and survival of coho salmon populations in the Covered Area.

To achieve this goal, the objectives of the Agreement are focused on activities that will improve instream flow, water temperature, rearing habitat diversity, spawning habitat, and riparian plant communities. The objectives of the Agreement and implementation of BMAs are as follows: :

- Implement water efficiency measures and other BMAs that improve instream flow and water temperatures,
- Construct off channel habitats such as alcoves and backwaters, reconnect secondary oxbow channels, and improve floodplain connectivity to provide velocity refuge and increase habitat diversity;
- Install large wood to increase cover and channel complexity;
- Add gravel to improve spawning habitat; and,
- Manage and restore riparian vegetation to improve riparian cover, diversity, stream shading and overall riparian function.

3. Components of the Adaptive Management Program

a. Implementation Monitoring

Implementation Monitoring includes those monitoring tasks associated with construction and implementation of BMAs (e.g. construction of habitat restoration projects) and AMMs. Implementation monitoring of BMAs serves to verify that habitat restoration projects are constructed as designed or intended. AMMs are intended to minimize or reduce potential adverse impacts that may occur during implementation of BMAs or during routine ranching and farming activities. Implementation Monitoring protocols are described in Appendix 3 of the Template Agreement, “Covered Activities and Avoidance and Minimization Measures.” Each Site Plan Agreement contains a description of the BMAs and AMMs that are permitted under the Agreement for the enrolled properties. Implementation of BMAs and AMMs will be conducted by the Permittees, the Shasta Watershed Conservation Group (SWCG), or a qualified contractor. Implementation Monitoring is generally a requirement of the grant programs that are likely to fund most of the BMAs identified under the Agreement. The results of Implementation

Monitoring will inform the Adaptive Management Program as projects are constructed and monitored.

b. Effectiveness Monitoring

Effectiveness Monitoring will provide data to evaluate the effectiveness of the Agreement in achieving the habitat, instream flow and water temperature objectives at the site and reach scale over the duration of the Agreement. The TAC described existing conditions for several habitat elements for each life stage of the Covered Species and at the reach scale within the Covered Area. The habitat parameters believed to be most important for coho salmon recovery and influenced by ranching and farming management activities, include hydrology/water quality, fish passage and migration, riparian condition, spawning substrate quality, instream habitat complexity, channel structure and floodplain function. Hydrology and water temperatures were identified as the primary parameters in need of improvement. Thus, Effectiveness Monitoring of these parameters will occur at both the site and reach scales and will be based on a review of existing information, results of experimental flow strategies, and professional judgement. Other habitat parameters, such as fish passage conditions, riparian function, spawning substrate, instream habitat complexity, and channel and floodplain function were identified as secondary parameters that are also in need of improvement. While the secondary habitat parameters are important, without improvements to instream flow and water temperature, the benefits to coho salmon associated with enhancement of secondary habitat parameters would be reduced.

c. Effectiveness Monitoring Elements

i. Hydrology

Effectiveness Monitoring for hydrology and water temperature will consist of installation and operation of fixed monitoring stations (Table 1) located throughout the reaches within the Covered Area. The monitoring stations will assist in determining whether any detectable spatial and temporal changes in water quantity and temperature have occurred at the reach scale following implementation of BMAs. The monitoring stations will also be used to provide data to assist Permittees in implementing the reach-wide flow management strategy.

The Nature Conservancy, CDFW, local water districts, and the Shasta Valley Resource Conservation District have also collected water quality data at various locations in the Shasta River watershed. Data from these efforts will be incorporated into the effectiveness monitoring program under the SHA, where appropriate. Landowners will provide access for installation and maintenance of the monitoring stations. The stations where discharge measurements are necessary (as indicated by asterisks) will need to be rated to develop stage discharge relationships. Flow accuracy will be affirmed annually prior to June 1. Figure 1 shows approximate locations of each of these stations.

Table 1. Safe Harbor Agreement water quality monitoring locations

Reach and Station Locations	Designation	Monitoring Element	Maintenance Responsibility	Data Access
Reach 1- Upper Shasta River - Parks Creek Confluence to Dwinnell Dam				
MWCD* Dwinnell Dam	DRE/DWN	RT Storage/Elevation	MWCD	Public
MWCD Cross Canal/Prior Rights	SRX	RT Discharge /Temp *	MWCD	Public
MWCD Instream Flow Release	DFB	RT Discharge /Temp *	MWCD	Public
MWCD Dwinnell Dam Seepage	DSW	RT Discharge /Temp *	MWCD	Public
MWCD Upstream of Riverside Road	MWCD-RSR	RT Stage/Temp/Air *	MWCD	Private
HVR Upstream Property Line	HVR-US	RT Stage/Temp/Air	SWCG	Private
HVR Downstream Property Line	HVR-DS	RT Stage/Temp/Air	SWCG	Private
Shasta River upstream of Confluence with Parks Creek	SRabvPC	RT Discharge/Temp *	SWCG	Private
Reach 2 - Mid Shasta River – Highway A-12 to Parks Creek Confluence				
Upstream Big Springs Creek	SRabvBSC	RT Temp	SBSR	Public
Grenada Irrigation District	SPU	RT Discharge/Temp *	SWCG	Public

Shasta River Below A-12	SBG	Temp	SWCG	Private
Reach 3 - Big Springs Creek – Shasta River Confluence to Water Wheel				
Big Springs Creek Lake	BSLake	Temp	Proposed/SBSR	Public
Water Wheel	BSC-WW	RT Discharge/Temp	SBSR	Public
Big Springs Creek Mouth	BSCMouth	RT Temp	SBSR	Public
Reach 4 - Upper Parks Creek – Interstate 5 Crossing to Above MR-1				
Upstream of Diversions on Parks	UPC	RT Discharge/Temp *	SWCG	Public
MWCD Parks Diversion	MPD	RT Discharge	MWCD	Public
Below MWCD Diversion	PME	RT Discharge/Temp *	MWCD	Public
Upstream I-5	PCE	RT Discharge/Temp *	SWCG	Private
Reach 5 - Mid-Parks Creek – Kettle Springs Confluence to Interstate 5 Crossing				
Below Parks 4 diversion		Non Real-time Stage/Temp/Q	SWCG	Private
Below Parks 5 diversion	PCM	Non Real-time-Stage/Temp/Q	SWCG	Private
Lower Parks Creek – Shasta River Confluence to Kettle Springs Confluence				

Kettle Spring Creek	KSC	Non Real Time-Temp/Flow	SWCG	Private
Parks Creek at Mouth	PBS	RT Stage/Temp	SWCG	Public

* MWCD, Montague Water Conservation District.

Instream flows will be monitored in real time at the locations identified in Table 1 and Figure 1. These stream gages will provide continuous, real-time stage, (water surface elevations, in feet) and temperature data. Stations that are indicated as priority sites for discharge monitoring to ensure flow management plans are implemented, will need to have regular stage-discharge curves created throughout the year. Channel morphology, moss/vegetation growth and other parameters may affect the development of a stage/discharge rating curves. These stage/discharge rating curves normally require a minimum of at least 9 discharge measurements per year. Some existing stations already have stable stage/discharge curves developed and will require less measurements. Gage data will be evaluated annually and at intervals during the year using an exacting, detailed, documented process to ensure high quality assurance and to maintain high quality control. Gage operation and data collection will conform to U.S Geological Standards, the highest standard for gaging natural stream flows. Gages will be operated and maintained monthly or more frequently and rating curve maintenance will require access to stations throughout the year.

Monthly documentation of gaging data will take place by gage managers consisting of outside staff readings. Once the measurements have taken place over the year, a rating curve will be developed for each particular gage which measures or records flow. This curve will reflect flow in cubic feet per second (cfs) in comparison to a given stage at each station. At the end of each water year a qualified hydrologist, as approved by CDFW or NMFS, will review and analyze all collected data, correct and amend data with uncertainty, and develop a certified packet for each station to include the daily streamflow data for each gaging location.

Big Springs Ranch is currently owned and operated by The Nature Conservancy (TNC). However, transfer of the ownership of the property to the CDFW is currently in escrow. The CDFW and TNC, in conjunction with researchers from U.C. Davis's Watershed Sciences Center, have already conducted extensive investigations in Big Springs Creek and the Shasta River downstream that describe coho salmon habitat use and existing baseline conditions. These efforts have also been monitoring changes to environmental conditions that began following improvements to land management practices and instream flow that were initiated when TNC took ownership of the property in 2010. Effectiveness Monitoring in Big Springs Creek will continue and includes operation of the current instream flow and water temperature gages (Table 1) to allow for evaluation of proposed additional BMAs into the future. Together these entities currently manage the water operations on Big Springs Ranch with the primary objective of improving instream flow and water temperatures to benefit coho salmon.

To improve monitoring of water diversions and provide data necessary to better understand the annual hydrology within the Covered Area, particularly in Parks Creek, all water diversions will be upgraded to meet the measuring standards required under California Senate Bill 88 (SB 88). SB 88 sets expectations for both the accuracy of measurement devices as well as the monitoring frequency of the device. The regulation links both device accuracy and monitoring

frequency based on the total volume of the water right. Larger diversions and larger reservoirs or ponds have more stringent measurement and monitoring requirements and more stringent requirements for the installation and certification of measurement devices. Water measuring devices for diversions of 1,000 acre feet per year or more must be able to record diversions hourly with an accuracy of 10% or less. Diversions that divert a volume equal to or greater than 100 acre feet per year must be able to record diversions daily, also with an accuracy of 10% or less. Diversions with a volume of greater than 10 acre feet may record weekly with an accuracy of 15% or less.

ii. Water Temperature

Water temperature is an important water quality constituent for the survival and growth of coho salmon. Warm water temperatures during the summer are believed to be a primary limiting factor for coho salmon. Reach scale improvements to water temperature are anticipated to occur from additional cold water inputs, changes in water management strategies, and from improvements to stream channel morphology and riparian vegetation that result through implementation of BMAs and AMMs over time. A near-continuous record of water temperature is essential to observe the daily maximum water temperature. Temperature monitoring will be implemented at each station shown on Table 1. Both water temperature and riparian air temperature will be measured at each location. The collection interval will be short enough to record the maximum values for any one day. Half-hour readings are commonly recommended, but 1-hour intervals are acceptable. Sampling will be continuous and will be monitored for the duration of the Agreement. At the end of each water year a qualified hydrologist will review and analyze all collected data, correct and amend data as appropriate and develop a certified packet for each station.

Implementation of flow management strategies and BMAs will also improve water temperatures at the local site scale where either cold spring water or groundwater contributions to the channel are anticipated. Therefore, effectiveness monitoring must also be able to demonstrate changes in water temperature at the local site scale. Effectiveness monitoring of water temperatures at the site scale should incorporate a systematic linear approach at each cold water input site in order to fully describe the longitudinal extent of cold water benefits downstream. The monitoring effort should attempt to duplicate the spatial and temporal extent of previous experimental flow releases that were conducted by AquaTerra Consulting in the upper Shasta River (2015) and Parks Creek (2017). This monitoring effort should be conducted following implementation of flow management strategies and water conservation activities to evaluate the full extent of water temperature benefits that were envisioned during development of the Agreement. Site scale monitoring should occur during the summer period and should attempt to duplicate the timing of previous experimental flow releases that have been conducted in the upper Shasta River and Parks Creek.

Operation and maintenance of the current water temperature monitoring stations (Table 1) in Big Springs Creek should continue.

iii. Secondary Habitat Elements

Secondary habitat elements include improvements to fish passage conditions, riparian function, spawning substrate quality, instream habitat complexity, and off channel habitat features. All of these types of habitat improvement will undergo implementation monitoring to evaluate if the features were constructed as designed with the intended benefits provided. Construction of

secondary habitat elements is also expected to provide reach level benefits by creating more favorable conditions that allow coho salmon to expand their distribution and improve adult to smolt survival rates. Placement of large wood is expected to improve cover complexity, increase velocity diversity, and provide important cover from predators and provide sheltered areas that provide some protection from seasonal high flow events. Introduction of spawning gravels is also expected to provide immediate benefits to spawning adults and may also improve diversity and production of invertebrate food items important to fry and juvenile salmon. Although these types of habitat features are strategically placed within the channel, large flood events may cause these features to move downstream and become redistributed through natural fluvial processes. The redistribution of these habitat features may result in unforeseen habitat benefits further downstream within the reach depending on where and how they deposit during high flow. The cumulative benefits the result from construction of multiple secondary habitat features and the potential redistribution of these habitat features during high flow events, when they occur, are expected to provide reach scale benefits that should be monitored over time. Table 2 identifies potential monitoring elements that may be evaluated during the term of the Agreement to assess effectiveness of secondary habitat attributes at the site and reach-scale. Monitoring elements that will be required on specific properties will be identified within the effectiveness monitoring section of individual site plan agreements. Permittees will also define monitoring assistance needed for the reach-scale effectiveness monitoring (such as providing access or data) as listed in Table 2.

Table 2- Secondary Habitat Monitoring Elements

Monitoring Element	Description	Time	Frequency	Landowner Commitment	Responsibility
Spawning Gravel	Photo Point and mapping to monitor the distribution of spawning gravel over time.	September - January	1 per year while spawning survey is conducted	Allow Access as specified in Site Plan	DFW/NOAA/ mutually approved contractor
Large Wood Evaluation	Photo Point				
Riparian*					

Critical Riffle Analysis	Quantitative	All Year	Once per 5 years or after floods if justified to confirm passage for all life stages		

*Tracking riparian habitat extent may be accomplished using aerial photo interpretation (e.g., Google Earth) along with spot checks/photo points in the field, comparing to mapping that has already been done.

d. Performance Indicators and Success Criteria

The development of performance indicators is a critical step in the adaptive management process. Performance indicators should be measurable and should relate directly to the objective being evaluated and should accurately reflect those habitat parameters that are anticipated to be responsive to implementation of BMAs. Habitat responses are anticipated to include improved instream flow and water temperatures to improve conditions for freshwater life stages of coho salmon. Because habitat characteristics and potential restoration opportunities differ between river reaches, the TAC recommended development of reach specific performance indicators and success criteria. This strategy may be appropriate for those secondary physical habitat parameters, such as channel geometry and complexity, riparian community structure, and floodplain characteristics, which are created and maintained by reach level parameters that include instream flow, sediment transport, and channel slope. However, unlike these parameters, water temperature has a direct effect on fish metabolism and health. water temperature is the overriding parameter that determines whether or not other physical habitat characteristics provide conditions suitable for coho salmon growth and survival. In other words, even under ideal conditions where both cover and water velocities provide optimum conditions for rearing coho salmon, if water temperatures are above lethal levels the benefits of those other parameters can never be realized. Performance indicators and success criteria for water temperature are the same for all river reaches within the Covered Area and will be used to evaluate the benefits from BMAs.

The following sections provide a description of performance indicators for water temperature, hydrology, fish passage, riparian, and other secondary habitat elements that will be used to evaluate the effectiveness of BMA implementation over the term of the Agreement. Performance indicators for water temperature, hydrology (flow) and fish passage need to be quantitative and reflect the habitat suitability requirements of coho salmon. Performance indicators for the secondary habitat parameters described above are qualitative and will rely on photo monitoring and results of the implementation monitoring and validation monitoring efforts.

i. Water Temperature

Warm water temperatures during the summer rearing period is one of the key factors limiting the survival and recovery of coho salmon in the Shasta River, Big Springs Creek and Parks Creek. In a review of the effects of water temperature on coho salmon, Stenhouse et al. (2012) found that water temperatures exceeding 20.3 °C have detrimental effects to rearing coho salmon (Table 3). In the Shasta River, Chesney et al. (2009) found that juvenile coho salmon avoid habitats when water temperatures begin to approach 20 °C and will migrate to cold water refugia habitats often associated with cold water spring sources.

Table 3. Water temperature criteria for coho salmon in the Shasta River and Parks Creek as described by Stenhouse et al. (2012).

Description	Water Temperature °C
Optimal	10 - 15.5
Suboptimal	15.6 - 20.3
Detrimental	> 20.3

Water temperatures commonly exceed 20 °C during the late spring and summer throughout much of the Covered Area. Many of the BMAs and flow management strategies are designed to improve water temperatures in the Shasta River and Parks Creek with the objective of keeping water temperatures below 18 °C to optimize available rearing habitats and delay triggering behavioral induced movement of juvenile coho salmon in the spring and early summer. Currently water temperatures can begin to exceed 20°C in May and warm water conditions typically remain a concern until late September. The objective of the flow management strategy is to optimize cold water habitats and provide stream connectivity to allow coho salmon to migrate to cold water spring input areas for summer refugia. These expected improved conditions would also support food production from riffle habitats and allow coho salmon more opportunities to move between habitats when water temperatures outside of refugia areas allows.

Performance Indicators

Performance indicators for water temperature are designed to evaluate water temperature conditions that trigger behavioral induced movement and provide improved water temperatures for a longer duration during the summer rearing season. Therefore, water temperature performance indicators will employ two sets of criteria. A performance indicator of 18°C will be used to evaluate the onset of behavioral induced movement during the spring. The second set of water temperature criteria will focus on the physiological suitability of water temperatures and will use the criteria described by Stenhouse et al. (2012) for the Shasta River presented in Table 3. The evaluation will compare the number of days between May 1 and September 30 when water temperatures remain less than 18°C and will also compared the number of days in which water temperatures were determined to be optimal, suboptimal and detrimental as described in Table 3.

Success Criteria

The greatest benefits to water temperature will occur at the site scale where BMAs result in increased cold water contributions from springs or groundwater that enter directly into the stream. Improvements in water temperature at the reach scale may also occur as improvements in water conservation and management, channel structure, and riparian vegetation improve over time.

To evaluate the success of BMAs relative to water temperature at the reach scale, water temperature conditions will be compared between an estimated baseline and measured future condition using water temperature data collected at the water quality monitoring stations listed in Table 1. Estimates of the baseline conditions will be derived based on the information described in Aqua Terra (2015, 2017) and other sources of water temperature data that may become available. The evaluation will compare the number of days between May 1 and September 30 when water temperatures remain less than 18°C and will also compared the number of days in which water temperatures were determined to be optimal, suboptimal and detrimental (Table 3) each water quality monitoring station.

To fully evaluate the benefits of cold water contributions at the site scale the spatial extent of water temperature benefits downstream for each point source contribution will be measured. Previous experimental flow releases have been conducted in the upper Shasta River and in Parks Creek to evaluate the potential effects that various flow management strategies have on water temperature (AquaTerra Consulting 2015, 2017). Both of these experiments were conducted during the summer (July and August) and provide a snapshot of existing flow and water temperature conditions and potential improvements to those conditions that may occur under differing management strategies including implementation of the BMAs. The data collected provides the best available source of information describing current water temperature conditions for streams in the Covered Area during the summer rearing season. Duplication of these two flow experiments following implementation of BMAs is expected to provide the best method to evaluate improvements at the site scale (longitudinally) while also documenting improvements at the larger reach scale. It is anticipated that most BMAs will be constructed and implemented within the first five years of the Agreement. Therefore, these two flow experiments will be scheduled to occur in year five and after water conservation related BMAs have been implemented. The stream lengths that correspond to each set of temperature criteria developed by Stenhouse et al. (2012) can then be estimated and compared to baseline conditions that were present prior to the Agreement in Parks Creek and in the upper Shasta River.

ii. Hydrology

McBain &Trush, Inc. (2013) developed Instream Flow Needs (IFNs) estimates for salmonid species that use the upper Shasta River and the lower 8 miles of Parks Creek, also referred to as the Big Springs Complex. The study included estimates of minimum flow rates that would provide suitable conditions for several life stages of Chinook and coho salmon including summer rearing, adult spawning, winter rearing, juvenile spring rearing and outmigration (Table 4). In their study, they developed flow recommendations for the Shasta River downstream of Parks Creek (Mid-Shasta Reach), Parks Creek downstream of I-5 crossing (Mid and Lower Parks Creek Reaches), and for the Upper Shasta River just upstream of the Parks Creek confluence (Upper Shasta River Reach).Their evaluation did not include instream flow needs (IFNs) estimates for Big Springs Creek. The McBain &Trush, Inc. (2013) study, “recommends

interim minimum instream flows to maintain native fish in good ecological condition, with a focus on several high priority life-history tactics that have been determined to be essential for population recovery within the Big Springs Complex. However, these minimum instream flows will not meet all Tier No.2 and Tier No.3 instream flow needs and therefore should not be expected to totally recover anadromous salmonid populations in the Shasta Basin." Although these IFNs recommendations may not be adequate to fully recover populations of coho salmon, the TAC is optimistic that use of these IFN estimates are useful to develop the flow strategy within the Covered Area, will be sufficient to reverse the current declining trend in population abundance, and create more favorable conditions that will contribute to recovery of the Covered Species. Although the Agreement targets coho salmon, the magnitude of the IFNs proposed by McBain &Trush, Inc. are similar for both species even though the timing of the flow estimates can differ. Given these differences in life stage timing between Chinook and coho salmon it is important to note that instream flow targets proposed here emphasize coho salmon life history strategies.

Table 4. Recommended interim minimum Instream Flow Needs for priority reaches in the Big Springs Complex (McBain & Trush, Inc., 2013).

Salmonid Life Stage	**Mid Shasta below Parks Creek** **QMIN (cfs)**	**Mid Parks below Slough Road** **QMIN (cfs)**	**Lower Parks above confluence** **QMIN (cfs)**	**Upper Shasta above Parks Ck** **QMIN (cfs)**
September 7 to September 30: Early Adult Chinook Salmon Migration	20	11 to 15	11 to 15	10
October 1 to December 31: Chinook and coho Salmon Spawning Habitat and Adult Chinook Migration	20 to 22	11 to 15	11 to 15	10 to 13
January 1 to March 31: Winter Juvenile Salmonid Rearing Habitat	20	10	12	7 to 10
April 1 to June 15: Spring Pulse and Smolt Outmigration	40	20 to 25	20 to 25	20 to 25
June 16 to September 6*: Summer Juvenile Salmonid Rearing Habitat	13	2	7	6

In July of 2015, Aqua Terra Consulting, MWCD and several cooperating landowners conducted an experimental flow and water temperature study in the upper Shasta River downstream of Dwinnell Dam to the confluence of Parks Creek (Aqua Terra Consulting 2015). The water

management strategies evaluated included variation in release volumes from Dwinnell Reservoir, use of cold groundwater pumping to supplement reservoir releases, and use of water exchanges to increase cold spring water releases to the river. The results of the experiment provide valuable insight for implementation of water management strategies that improve water temperatures within the reach. Findings indicated that releases of about 11 cfs from Dwinnell Dam that were comprised of 5 cfs from the reservoir, 5.5 cfs of cold groundwater from the Flying L Pumps, and 0.5 cfs of cold seep water from the base of the dam provided the greatest over all benefit to water temperatures. In addition, the experiment also provided additional insight to describe the current base line conditions and helped to verify the predictions of the water temperature model outputs provided by Water Course Engineering with funding from the SWCG. These release volumes exceed the recommended minimum IFNs (6 cfs) proposed by McBain & Trush, Inc. (2013) for summer rearing habitat.

MWCD Conservation and Habitat Enhancement and Restoration Project Flow Schedule

MWCD is implementing a Conservation and Habitat Enhancement and Restoration Project (CHERP) for the operation of their facilities in the Upper Shasta River and Parks Creek. In MWCD's application for a Corps 404 permit, MWCD proposed a change to its operations for the delivery of water to the Upper Shasta River described as "CHERP flows." This includes the use of the Flying L groundwater pumps to provide a source of cold water for fish immediately downstream of Dwinnell Dam. The volume of water conserved through the lining of MWCD's main canal provides a source of water to implement CHERP flow releases. When conserved water becomes available MWCD will begin to release CHERP flows. The volume of releases will vary depending on the water year type which will be determined during the spring of each year. MWCD proposes to make the year type determination on, or around, March 1st and then updated on April 1st and again on May 1st. The criteria for year type determination are based on reservoir storage and snowpack, but vary between months. A process of examining changing year type within a year (from March 1 to May 1) is included to accommodate the potential changes in spring time conditions that may lead to more or less water available for the upcoming period. The method proposed to determine the water year types were developed by Watercourse Engineering, Inc. (2016). There will be five water year type designations and release strategies ranging from very dry (2,662 acre feet), dry (3,541 acre-feet), normal (4,437 acre-feet), wet (6,236 acre-feet), and very wet (8,152 acre-feet). MWCD also is obligated to release 1,984 Acre-Feet of water to landowners downstream who had water rights to the Shasta River prior to the construction of Dwinnell Dam. These releases are commonly referred to as "prior rights" releases and are delivered by MWCD in the Shasta River to these landowners when requested during the irrigation season (April 1st to October 1st). These releases are typically delivered between mid-April and mid-August but can vary depending on hydrologic conditions and the needs of the water right owners. Therefore, the total water releases downstream of Dwinnell Dam include prior rights releases, MWCD customer releases, and the proposed environmental water releases under CHERP.

MWCD's objectives when developing the flow release strategies were to ensure that the suitable hydrologic conditions would be provided for all life stages of coho salmon in very dry water years. As hydrologic conditions improve from dry to very wet, increased flow releases would further improve conditions for all life stages of coho salmon as well as other anadromous species. In wet and very wet water years an additional block of water is provided to be released

adaptively for other purposes such as sediment flushing, habitat maintenance, or to enhance migration. The proposed CHERP flow schedules and assumed timing of prior rights releases from Dwinnell Dam for each water year type, excluding block water releases, are presented in Figures 2 through 6.

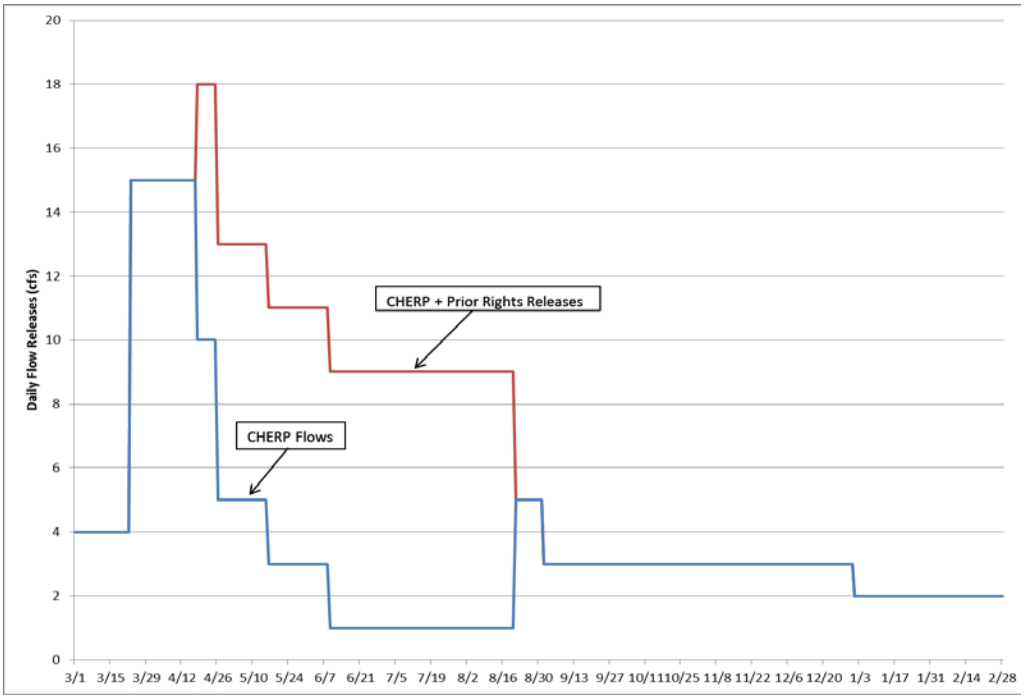

Figure 2 Total water releases below Dwinnell Dam under a very dry water year. The total releases includes both the proposed CHERP environmental water releases along with the assumed timing of prior rights water releases that typically occur during the irrigation season.

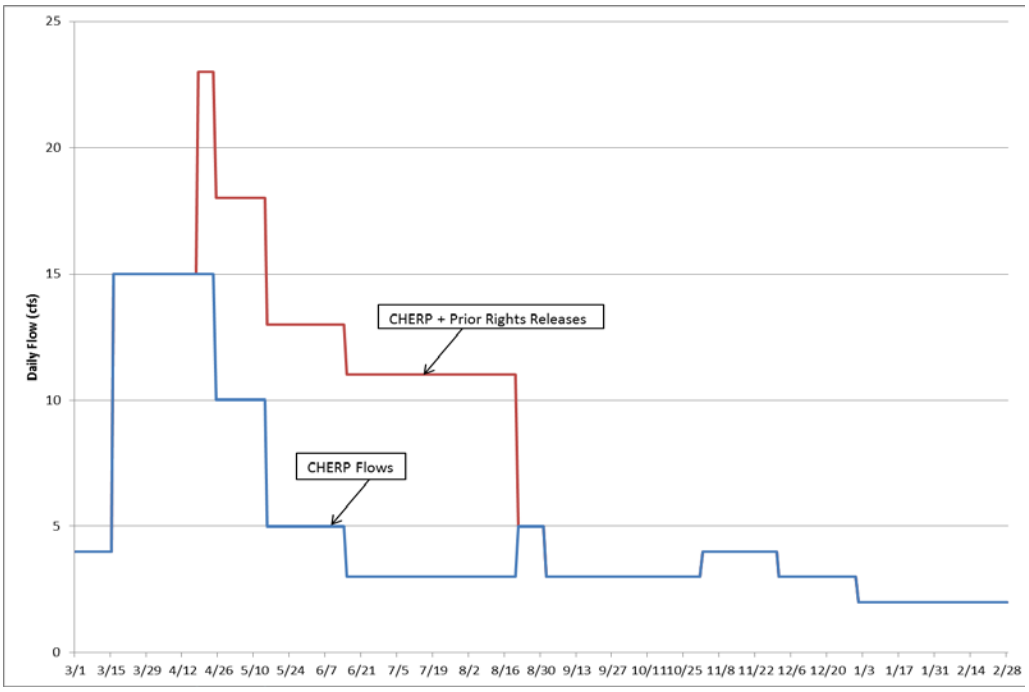

Figure 3. Total water releases below Dwinnell Dam under a dry water year. The total release includes both the proposed CHERP environmental water releases along with the assumed timing of prior rights water releases that typically occur during the irrigation season.

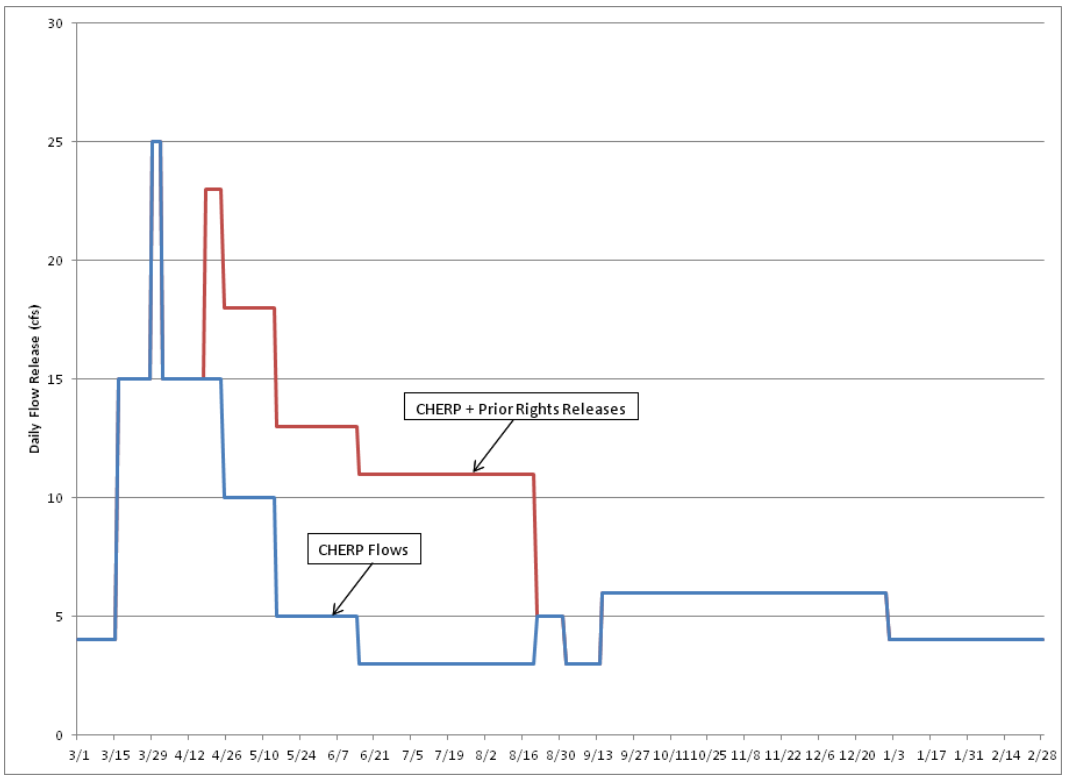

Figure 4 Total water releases below Dwinnell Dam under a normal water year. The total release includes both the proposed CHERP environmental water releases along with the assumed timing of prior rights water releases that typically occur during the irrigation season.

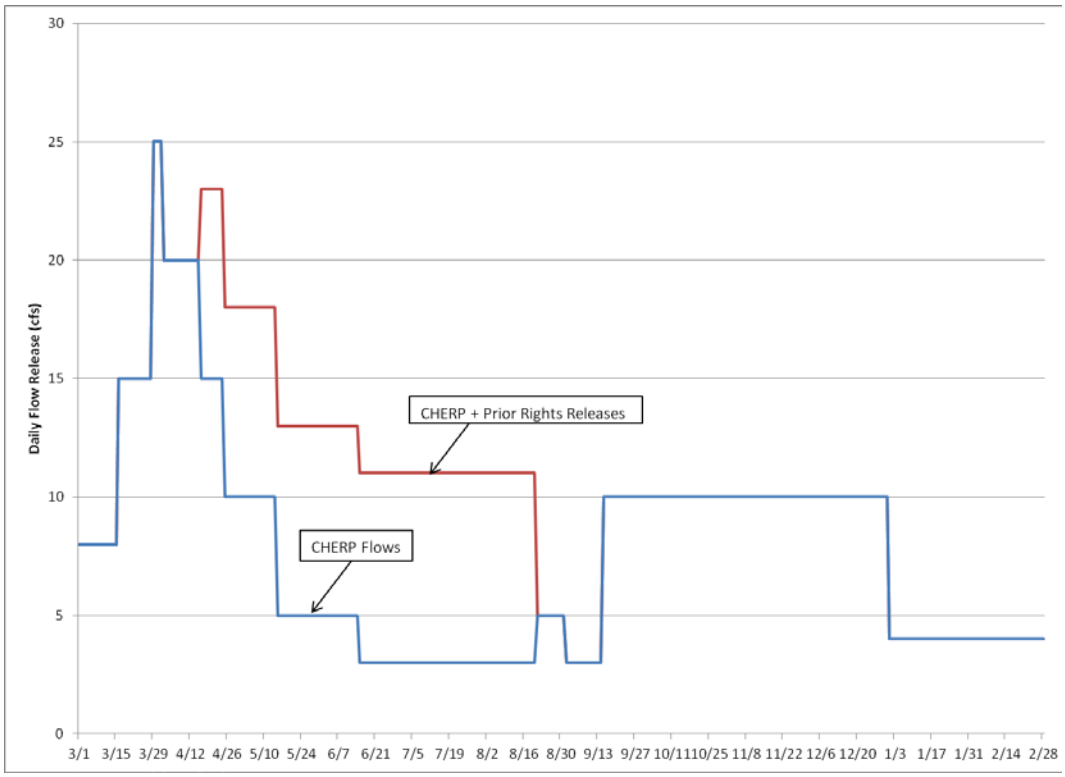

Figure 5. Total water releases below Dwinnell Dam under a wet water year. The total release displayed includes both the proposed CHERP environmental water releases along with the assumed timing of prior rights water releases that typically occur during the irrigation season. The block water volume of 684 Acre-Feet is not included here as this water is anticipated to be used in an adaptive manner based on the hydrologic and biological needs present that year.

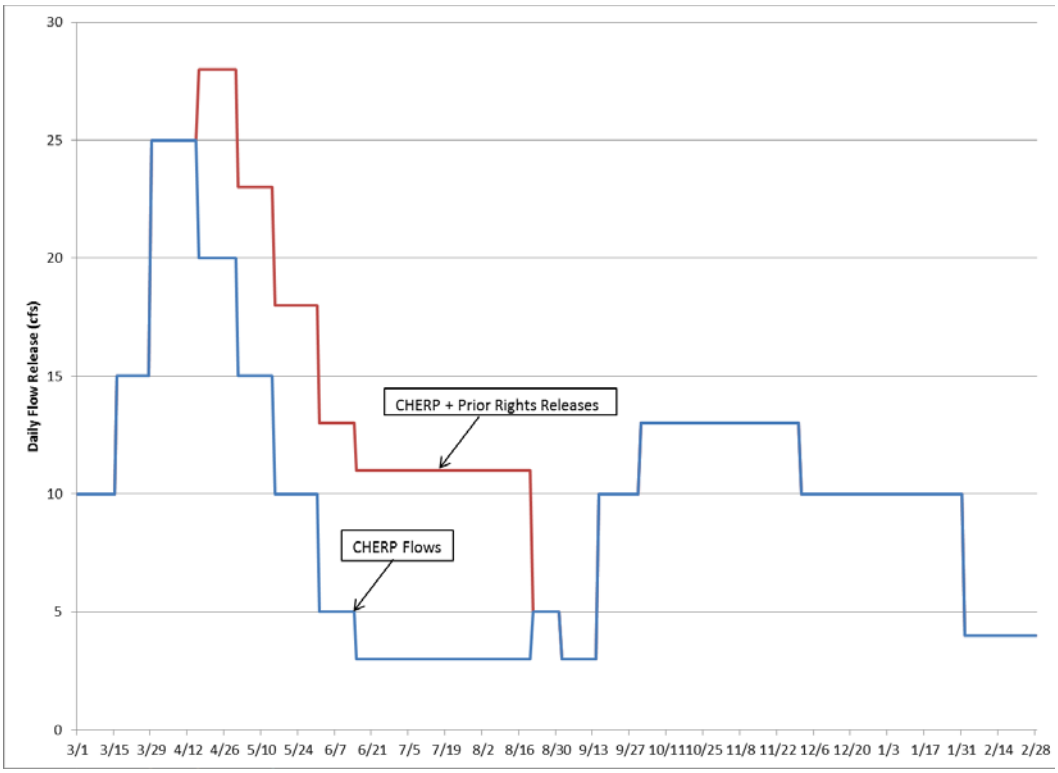

Figure 6 Total water releases below Dwinnell Dam under a very wet water year. The total release displayed includes both the proposed CHERP environmental water releases along with the assumed timing of prior rights water releases that typically occur during the irrigation season. The block water volume of 1,154 Acre-Feet is not included here as this water is anticipated to be used in an adaptive manner based on the hydrologic and biological needs present that year.

MWCD Interim Flow Schedule

Lining of MWCD main canal may take up to five years to complete and CHERP flows will not occur until this water conservation project is complete. Prior to completion of the canal lining, MWCD will implement an interim flow schedule with conservation measures to improve water quality and habitat conditions for aquatic resources. As facilities are upgraded, additional volumes of water will be delivered with the proposed CHERP flows fully implemented at the end of the five-year Corps permit in about 2023. The interim flow plan includes ongoing flow releases that are consistent with the December, 2013, Settlement Agreement between MWCD, Klamath River Keeper, and the Karuk Tribe, along with two additional conservation measures that are intended to benefit coho salmon. MWCD proposes to release a total volume of 2,662 acre-feet in years when storage is less than 18,000 acre-feet on April 1 (consistent with a Very Dry Water Year type). This is a net increase of 412 acre-feet above the current baseline of Settlement Flow releases. Under Settlement Agreement flows, MWCD's summer environmental flow releases are constrained by the temperature of water stored in Dwinnell Reservoir. Under the interim flow plan, MWCD proposes to utilize discharges from its Flying L pumps in consultation with NMFS to improve the water temperature of flow releases consistent with proposed CHERP and existing MWCD irrigation water management operations for all water year types. Utilization of the Flying L pumps will allow for greater summer release rates and/or

cooler water releases than occur under current Settlement Agreement water management operations.

Under the Settlement Agreement, flow releases are described for two periods of time during the water year, “Winter Environmental Water” and “Base Environmental Water.” Winter Environmental Water releases occur between October 1 and April 1 during which time MWCD releases up to 1,126 acre feet of water downstream of Dwinnell Dam. Water release volumes during the spring and summer period are comprised of Base Environmental Water volumes and prior rights releases. The amount of Base Environmental Water available during is each year is determined based on the volume of water stored behind Dwinnell Dam on April 1. If storage is less than 18,000 acre feet, the Base Environmental Water volume is 2,250 acre feet. If storage is equal to or greater than 18,000 acre feet then the volume of Base Environmental Water is 3,000 acre feet. The Settlement Agreement also provides for “Additional Available Environmental Water” releases during the spring and summer period which are added to the Base Environmental Water release volume. When storage in Dwinnell Reservoir is greater than or equal to 20,500 acre feet, MWCD will release 30% of the volume of this additional stored volume of water downstream of Dwinnell for environmental purposes.

Parks Creek

In the spring, summer and fall of 2016, AquaTerra Consulting (TNC 2017) conducted a preliminary analysis of the hydrologic and water temperature conditions in Parks Creek with funding provided by The Nature Conservancy. The purpose of the investigation was to collect information that would help inform the relationship between instream flow, water temperature and fish passage conditions. A critical riffle fish passage study was incorporated into the investigation to help describe flow requirements necessary to provide fish passage over 6 critical rifles that were distributed along the lower 25 kilometers of Parks Creek. In general, the findings of the critical riffle study are comparable with the findings presented by McBain and Trush, Inc. (2013). The instream flows recommended by AquaTerra Consulting (2017) to provide fish passage for adult coho salmon is 10 cfs and for smolts (age 1+) it’s 5.6 cfs. The critical riffle analysis for age 0+ coho in the Upper Parks Creek Reach indicated that a minimum flow of about 2.7 cfs would provide adequate passage. There was only one critical riffle located within the Mid-Parks Creek Reach, toward the upper boundary of the reach, and the results of the analysis indicate that a minimum flows ranging between 3.5 and 4.5 were needed for passage of 0+ coho salmon.

In Parks Creek, MWCD’s CHERP will ensure that 15 cfs is bypassed at their Parks Creek Diversion between October 1 and December 15 to improve conditions for migrating adult coho salmon.

Performance Indicators

All of these investigations provide the best available information describing the instream flow needs for coho salmon, and therefore, provide a reasonable source from which performance indicators can be developed for specific life stages of coho salmon throughout the Covered Area of the Agreement. These studies were used to identify recommended instream flow targets for three life stages of coho salmon, adult migration and spawning, spring rearing and emigration, and summer rearing (Table 5). The two areas where BMAs are anticipated to have the greatest influence on coho salmon habitat is in Parks Creek and in the upper Shasta River upstream of the confluence of Parks Creek. The Covered Area (Figure 1) includes three reaches located in

Parks Creek (Upper Parks, Mid-Parks, and Lower Parks) and one reach in the Upper Shasta River, from Dwinnell Dam downstream to the confluence of Parks Creek. Performance Indicators for instream flow are presented for each of these four stream reaches are presented in Table 5. Performance Indicators are not identified for the Mid-Shasta Reach or Big Springs Creek. Instream flow volumes in these two reaches are generally sufficient to provide fish passage, spawning habitat, and rearing habitat for coho salmon, particularly downstream of the confluence with Big Springs Creek. Water conservation BMAs in Parks Creek and implementation of both interim flows and CHERP flow releases by MWCD further improve flow conditions downstream of the Parks Creek confluence with the Shasta River. Improving water temperatures and instream habitat complexity and off channel habitat are a higher priority to improve rearing conditions for coho salmon in both the Mid Shasta Reach and in Big Springs Creek.

Table 5. Performance indicators for instream flows for coho salmon in Parks Creek and the Upper Shasta River, upstream of Parks Creek.

	Adult Migration/Spawning **November 1 to December 31**	**Juvenile (1+) Rearing/Emigration** **March 1 to May 15**	**Fry/Juvenile (0+) Summer rearing** **May 15 to September 30**
Upper Parks Creek	11 cfs	20 cfs	3 cfs
Mid-Parks Creek	11 cfs	20 cfs	3 cfs
Lower Parks Creek	11 cfs	20 cfs	7 cfs
Upper Shasta River	11 cfs	20 cfs	6 cfs

Success Criteria

A description of baseline conditions is necessary to inform development of success criteria for both instream flow and water temperature. Data collected by AquaTerra (2015, 2017), CDFW, TNC, and other sources that may become available during the initial years of this monitoring effort prior to implementation of BMAs, will be used to help describe the current instream flow characteristics for each water quality monitoring location described in Table 1. Performance Indicators will be evaluated for both the baseline condition and future conditions at each water quality sampling location and for each coho salmon life stage period as BMAs and AMMs are implemented over time.

To measure success, the number of days that meet or exceed the Performance Indicators (flow targets; Table 5) for each life stage period will be compared between the baseline condition and current conditions through time. If, under future conditions, the number of days in which flow targets meet or exceed increases relative to the baseline or previous years, then conditions for this parameter will be considered to have improved. Since hydrologic conditions can be highly variable from year to year, determinations as to the success or failure of BMAs to improve flow conditions should not be based on a single year. Rather, success of the Agreement to improve flow conditions will be assessed annually so that results incorporate water year type variability, and therefore, provide a more robust set of information to better inform adaptive management. In addition, interpretation of instream flow data during the summer rearing period must be balanced with the need to improve the abundance and spatial distribution of important cold water refugia habitats.

iii. Fish Passage

A critical riffle fish passage investigation was conducted over five sites in Parks Creek during 2016 and the results of the investigation are included in the *Parks Creek Hydrologic and Water Temperature Assessment* conducted by Aqua Terra Consulting (2017). The investigation was conducted within the entire Covered Area in Parks Creek. The analysis was conducted following the protocols developed by the CDFW and the methodology is described in the "Standard Operating Procedure for Critical Riffle Analysis for Fish Passage in California" (CDFG 2012). The results of the investigation helped to inform development of the flow management strategy for Parks Creek that will be implemented through BMAs included in Site Plan Agreements located within Parks Creek. Changes in fish passage conditions could occur during the duration of the Agreement. These changes may be caused by channel forming flood events, through implementation of instream habitat restoration actions, or may occur more gradually over time as the BMAs and AMMs help stimulate natural channel and floodplain recovery. To evaluate potential changes to fish passage conditions in Parks Creek that may occur over time, critical riffle analysis will be repeated every 5 years from the Agreement, or after major flood events if reconnaissance surveys demonstrate a concern (Table 2). A critical riffle fish passage investigation is not believed to be necessary in the Upper Shasta, Mid-Shasta and Big Springs Reaches at this time since these reaches are either generally protected from flood flows, have more abundant reliable sources of flow (CHERP and Big Springs), or have more stable low gradient channels with adequate depth.

iv. Riparian Vegetation

A healthy riparian corridor provides multiple benefits to the Covered Species. Healthy riparian communities improve stream bank stability, provide shade to help maintain cold water resources, and may provide a source of wood to the stream channel to create cover and improve habitat diversity for coho salmon. Riparian plant communities vary in composition and quality throughout the upper Shasta River and Parks Creek. Some areas support large and contiguous cover of woody trees and shrubs, while other areas are highly altered or fragmented. There is also varying hydrological and sediment transport dynamics in the Covered Area that support different types of riparian plant communities in different reaches.

Many of the BMAs are designed to improve the conditions of the riparian corridor through installation of riparian fencing and improved grazing management of riparian pastures. The CDFW, working closely with the TAC, has developed a Google Earth map of the existing extent

of riparian vegetation on the enrolled properties using three vegetation cover types: woody vegetation, herbaceous riparian vegetation, and open water/no riparian cover. This mapping effort provides the best available information from which changes to riparian vegetation can be evaluated by reach over the term of the Agreement. Therefore, this baseline map of riparian vegetation shall serve as the basis for which changes to the riparian corridor will be evaluated. The TAC recommended that riparian mapping be conducted every ten years to allow adequate time for riparian communities to respond to BMAs and environmental conditions.

v. Instream Habitat

To improve instream habitat quality and diversity some Site Plan Agreements include placement of spawning gravels, construction of large wood structures, construction of alcoves and reconnection of off channel features such as oxbows and side channels. The effectiveness of these BMAs is dependent on the presence of suitable instream flow, water temperature, flooding, and geomorphic processes that these features experience over time. However, when flows and water temperatures are improved, instream habitat improvements are expected to provide additional rearing habitat with more abundant cover and diverse water velocity profiles where coho salmon feeding opportunities can be optimized. Success criteria for these types of projects will rely primarily on the results of the implementation monitoring conducted specific to each project. The persistence of each restoration action will be qualitatively assessed during surveys conducted by agency staff or contractors as described in Table 2. Validation Monitoring efforts may also document use of these habitat features by coho salmon as described in the following section.

e. Validation Monitoring

The purpose of Validation Monitoring is to gather biological data to evaluate whether habitat improvements have affected the survival and spatial distribution of the Covered Species. . As previously stated, the goal of a Safe Harbor Agreement is to promote the conservation, enhancement of survival, and recovery of coho salmon. The primary limiting factors for coho salmon in the Shasta River and Parks Creek include impaired instream flow and adverse water temperatures, poor spawning substrate quality, poor riparian habitat conditions, a lack of habitat diversity, degraded channel structure, and poor connectivity to off channel habitats (side channels and alcoves) and floodplain habitat features. The BMAs and AMMs were designed to improve conditions with the overall objective of providing a net conservation benefit that will contribute to the recovery of the SONCC coho salmon ESU. The coho salmon life history phases that occur within the Covered Area include spawning, incubation, fry and juvenile rearing and smolt emigration. Although there are multiple factors that influence survival, distribution and productivity of coho salmon populations through their freshwater and ocean life histories, including factors outside of the Covered Area, we anticipate that improvements to habitat quality within the Covered Area will improve distribution, abundance, and survival of coho salmon over time.

The CDFW has been monitoring coho salmon populations within the Shasta River for several decades through the efforts of its Klamath River Project and Anadromous Fish Research and Monitoring Program. These efforts provide information describing the distribution and abundance of both adult and juvenile coho salmon produced within the Shasta River and also estimate survival rates from the adult to the smolt life stage based on the rotary trapping of emigrants. Use of Passive Integrated Transponder (PIT) tag technology in recent years has

provided additional information describing habitat use, movement patterns, growth rates, and survival. Current knowledge and historic trends in this population data combined with recent findings can serve as the baseline from which the future distribution, abundance and smolt survival rates can be monitored into the future as implementation of BMAs improve habitat conditions. Continuation of these efforts will be crucial to the overall evaluation of the Agreement. CDFW's continued monitoring will be contingent on staff availability and funding. Data collected through these efforts will be used to verify coho salmon use of instream habitat structures, introduced spawning gravels, and off channel habitat features. A summary of the validation monitoring elements that will be conducted to help evaluate biological responses to BMAs and AMMs are summarized in Table 6.

Table 6. Summary of validation monitoring elements to document the biological response of coho salmon to BMAs within the Covered Area.

Monitoring Element	Description	Time	Frequency	Landowner Commitment	Responsibility
Spawning Survey	Presence/ Absence	September - January	1 Survey per week during spawning	Allow reasonable access as specified in Site Plan	DFW/NOAA/mutually approved contractor
Juvenile Surveys and PIT tagging	Presence/absence surveys in habitat structures, cold water refugia, and off channel features. Includes collection for PIT tagging	All year	Variable depending on population status and time of year. Less frequent during the winter (monthly) and more frequent in the spring and summer (weekly)		
PIT tag Arrays (Capturing and Tagging Juveniles)	Monitor movement-between reaches	All Year	Maintenance 1 per month and download 2 per month		

While Validation Monitoring is important to document the biological response of coho salmon to BMAs, the effectiveness of the BMAs and AMMs cannot be judged solely on the biological

response due to multiple factors that influence coho salmon survival throughout their range and life history, many of which occur outside of the Covered Area including the lower Shasta River, the Klamath River and the Pacific Ocean.

4. Evaluation

Implementation and Effectiveness Monitoring data will be used to inform whether BMAs are functioning as intended, whether there is a need to voluntarily eliminate or modify poorly performing BMAs or AMMs, or to recommend new voluntary BMAs or AMMs. Once all of the BMAs have been implemented, Validation Monitoring data will be used as a secondary measure to inform success of the BMAs. While NMFS and CDFW expect a net conservation benefit to result at the site scale on each enrolled property, beneficial reach scale habitat responses are also anticipated. While the level of reach scale response is difficult to predict relative to instream flows and water temperature changes, we expect that Effectiveness Monitoring complimented by Validation Monitoring, will help determine the level of reach-scale benefits from implementation of BMAs.

It is important to note that environmental and biological variability in reach scale responses are expected due to the following: 1) natural habitat variability; 2) variability in water year conditions and salmonid marine survival; 3) habitat suitability present within and among the reaches; and 4) variability in the number and extent of BMAs that are proposed in each reach. Because of this variability, the evaluation of the effectiveness of BMAs will be rated qualitatively as beneficial, neutral or adverse by NMFS, CDFW and the SWCG. It is possible that water temperature improvements may have substantial benefits at the site scale while benefits at the reach scale may not be detectable in all areas. Thus, benefit ratings will be documented at both the site and reach scale. Table 7 below summarizes the recommended rating system.

A *Beneficial* rating will occur when effectiveness monitoring results indicate that all or most of the BMAs have met design objectives, e.g. improved instream flow and/or water temperatures at the site and/or reach scale. Once all of the BMAs have been implemented and Validation Monitoring occurs, coho salmon use and distribution data will be used as a secondary measure to gauge success of the BMAs. The outcome of a Beneficial rating is to continue implementation with continued monitoring of the BMAs.

A *Neutral* rating will occur if effectiveness monitoring efforts are unable to detect a habitat response at the site and/or reach scale. This may indicate that some or most of the BMA objectives are not being met at the reach scale, e.g. no detectable improvement to instream flows at the reach scale and/or improvement to water temperatures at the reach scale and/or site scale. This may also indicate that monitoring protocols are not effective at detecting the response in which case a review of the monitoring protocols should be conducted. The outcome of a Neutral rating will be to step up monitoring efforts on BMAs that are not performing to modify site features or flow management strategies, as necessary. Additional BMAs may be recommended as a result of a Neutral rating and as a result of collaboration between the Parties to determine what additional actions are needed. The Permittees would implement additional BMAs or modifications to BMAs on a voluntary basis.

An A*dverse* rating will occur when results of monitoring find negative effects of BMAs, e.g. a reduction in stream flow and/or increase in water temperatures at the site and/or reach scale. When an adverse determination is made, the Parties will work collaboratively to assess site scale implementation of BMAs, review all monitoring protocols to insure that methods are

capable of measuring parameters accurately, and will develop recommendations to voluntarily modify, improve or design new BMAs. The review process also needs investigate other biological and physical factors that may exist outside of the Covered Area that may have adversely impacted the performance of BMAs in the Covered Area. The modification or additions to BMAs that may be recommended through this Adaptive Management Program will be voluntary.

Table 6. Post implementation rating table.

Ratings **(site/reach scale)**	**Objective**	**Criteria**	**Unintended Effects**	**Structural Condition**	**Outcome**
Beneficial	Achieved all or most design objectives	All to most BMAs achieved desired habitat response	None or minimal unintended adverse effects	Excellent to Good with intended functional value	Continue to monitor
Neutral	Some or most design objectives not achieved	Some or most features do not achieve desired habitat response	Minor or major unintended effects that offset desired response or objective	Poor to fair with some functional value	Step up monitoring on features exhibiting negative performance. Correct site feature deficiencies or management strategies as appropriate, including the option of adding sites/features or adjusting management strategies
Adverse	No site objectives achieved	Most features did not achieve desired habitat response	Unintended effects degrading habitat	Fail, has no functional value	Revisit site potential and feature level design or management objectives. Redesign or add more sites/features or management strategies.

5. Monitoring and Reporting Responsibilities

Monitoring efforts will be conducted by various entities as identified in Site Plan Agreements and Appendix 3, including the SWCG and their agents, individual Permittees, NMFS, CDFW, and NGOs such as TNC and Caltrout (Parties to the Agreement) or their agents. Monitoring data will be collected annually following the calendar year beginning on January 1st and ending on December 31st. Implementation and Effectiveness Monitoring Reports and data gathered during the report period by the Permittees shall be provided to NMFS and CDFW by March1st of each year. NMFS and CDFW shall review the reports and data provided by each entity by March 31st. NMFS and CDFW may contact each reporting entity or their representative to resolve and/or clarify any questions or concerns that may arise during their review. NMFS and CDFW will work collaboratively with the Permittees or their representative to incorporate the findings of each annual reporting effort into a single Draft Effectiveness Monitoring Annual Report for the Covered Area by May 1st . The Parties will review the Draft Effectiveness Monitoring Annual Report and will provide any comments to NMFS, CDFW and the Permittees, or their representative, by May 31st. NMFS, CDFW and the Permittees, or their representative, will review and address all comments received and will work collaboratively to produce a Final Effectiveness Monitoring Annual Report by June 30th. The Final Effectiveness Monitoring Annual Report shall be available to the public from the NMFS or CDFW upon request.

The Permittees have developed a list of questions that are intended to help guide monitoring efforts, evaluation of the BMAs, and provide focus for the analysis and development of the Effectiveness Monitoring Annual Reports. NOAA, CDFW and the SWCG will address each question during development of the Annual Report using the information gathered by SWCG, NGO's and Agencies during the previous year. The findings described in the Annual Report will help inform Adaptive Management Program decisions including whether voluntary adjustments to BMAs or water management strategies will be recommended The following questions will be addressed in the Annual Report and will guide evaluations and inform adaptive management:

- Were BMAs implemented as designed and scheduled? (this determination will be made based on individual site plans, the Annual Report and site visits).
- Has sufficient time passed for each BMA to be fully effective? (this will be determined based on review of the BMAs implemented and expected habitat response based on literature)
- Is the BMA being effectively maintained and managed? (based on the Annual Report and site visits)
- Is the extent/intensity of BMAs sufficient to detect a habitat response at the site scale?
- Is the extent/intensity of BMAs sufficient to detect a habitat response at the reach scale?
- Did implementation of BMAs affect water temperature or flows during all freshwater life history phases for the Covered Species at the site scale and reach scale?
- Is the Covered Species utilizing the habitat features created by the BMAs?
- Did the spatial distribution of coho salmon increase following the implementation of BMAs within the Covered Area?
- Did the abundance and/or survival of freshwater life stages of coho salmon

improve following the implementation of BMAs within the Covered Area or the Shasta River basin?

6. Modification of BMAs or AMMs

BMAs to be implemented on each enrolled property have been negotiated under the Agreement and are described in each Site Plan Agreement. An Enhancement of Survival permit will be issued to each Permittee and provide that, so long as the Permittee is complying with the terms of the Agreement, Site Plan Agreement, and associated Permit, a Permittee will not be liable for incidental take of Covered Species resulting from: Routine Agricultural Activities, Beneficial Management Activities, and Return to Baseline. The main purpose of the Agreement is to provide a net conservation benefit for the Covered Species through voluntary conservation measures on non-federal lands on enrolled properties, while giving assurances (subject to the terms of the Template SHA) to the Permittees that no additional restrictions will be imposed as a result of their conservation actions. In other words, once a Permittee agrees to BMAs identified in his or her Site Plan Agreement, the Permittee can be assured that there will be "no surprises" in the future such as new requirements that modify existing BMAs or require additional BMAs not described in the Site Plan Agreement (subject to the Template SHA that contains information regarding minor amendments, renewal of permits and termination of permits). Therefore, any recommendations to modify existing BMAs or AMMs, or to implement additional BMAs as a result of the Adaptive Management Program must be mutually agreed to by the Permittee, NMFS and CDFW and would only be implemented on a voluntary basis. In the event that results of the Adaptive Management Program or other unforeseen events suggest that a modification to the BMAs or AMMs would be beneficial, one of the Parties may send a request by letter or email to meet and confer. The Parties will then meet within 30 days of receipt of a request. The Parties agree to work together in good faith to discuss potential modifications to their Site Plan Agreements. Any modifications must be voluntary and mutually agreed to by the Parties.

7. Conclusion

Conservation efforts on non-Federal properties are essential to the survival and recovery of the Covered Species. Safe Harbor Agreements provide an ESA mechanism and incentive to encourage proactive voluntary species conservation efforts by private and other non-Federal property owners. Safe Harbor Agreements are collaborative stewardship partnerships between NMFS, non-Federal property owners, and other collaborators to promote conservation efforts on non-Federal Properties and help achieve ESA goals to recover listed species.

The Agreement contains provisions that allow for amendments and describe the processes necessary for the parties to modify the Agreement including Site Plan Agreements. These provisions allow the Parties to, by consensus, modify the Agreement or Site Plan Agreements to meet the changing needs of the Parties and/or the Agreement's conservation program. In order to facilitate an effective amendment process, the Parties have agreed to a set of amendment stipulations that, at a minimum, include 1) a notification provision to ensure that all parties are provided any proposed amendments; 2) a provision that all parties are given a sufficient opportunity to review and respond to any proposed amendments; and 3) a provision that identifies how the parties will handle approval or denial of any proposed amendments, including any dispute resolution process that may be desired, if appropriate. For each proposed

amendment, NMFS must determine whether the proposed amendment is a minor or administrative change, or a major modification of the Agreement that could result in outcomes that are significantly different from those previously analyzed. The Adaptive Management Program provides the mechanism to further improve implementation of the Agreement as new information is learned through voluntary collaboration.