

Big Springs Ranch Wildlife Area
Site Plan Agreement between the California Department of Fish and Wildlife
and National Marine Fisheries Service for the
Template Safe Harbor Agreement for Coho Salmon (*Oncorhynchus kisutch*)

A. Introduction

This Site Plan Agreement, developed within the framework of the Template Safe Harbor Agreement (Agreement) is for the purposes of enhancing the survival of Coho Salmon (Covered Species) that spawn and rear in the Shasta River, Siskiyou County, CA. This Site Plan Agreement is entered into by the California Department of Fish and Wildlife (hereinafter referred to as the Permittee) and the National Marine Fisheries Service (NMFS) (collectively referred to as “The Parties”). This Site Plan Agreement, combined with the measures prescribed in the Agreement, serves as the basis for NMFS to issue a Federal Enhancement of Survival Permit (Permit) to the Permittee pursuant to Section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended (ESA). The responsibilities of NMFS and the Permittee are detailed in the Agreement and this Site Plan Agreement. . This Site Plan Agreement is subject to the terms of the Agreement and the Permit.

This Site Plan Agreement documents site-specific information detailing the Permittee’s Enrolled Property, including the location and management authority of the property, its baseline conditions, and existing and proposed land-use activities. In addition, this Site Plan Agreement documents the conservation measures expected to benefit Coho Salmon that will be undertaken by the Permittee on the Enrolled Property.

B. Enrolled Property

B.1. General narrative describing property and map

The Permittee purchased the Big Springs Ranch Wildlife Area (BSRWA) from The Nature Conservancy (TNC) in 2019. Permittee will operate the property as a State Wildlife Area for the purposes of protecting and enhancing natural habitats for fish and wildlife, and providing public use opportunities that are compatible with the long-term conservation needs of fish and wildlife populations and their habitats. Permittee may consider the use of cattle as a management tool for wildlife habitat benefits based on an adaptive management approach.

BSRWA includes two ranches covering a total of 6,000± acres. Approximately five miles of the Shasta River and 1.5 miles of Big Springs Creek are included within the BSRWA property boundaries. The ranch lies within what has been designated as the **Mid Shasta Reach and the Big Spring Creek Reach** in the Agreement and is described in Template Agreement Appendix 2. Figure 1 depicts the approximate property boundaries, parcel numbers and general location of the property within the boundaries of the Template Safe Harbor Agreement Covered Area.

B.2. Legal Description of Property Boundary

The legal description is specified in **Appendix A**.

B.3. Description of Water Rights

Based on the Shasta River Adjudication Proceedings Judgement and Decree – No 7035 (1932), the Permittee is authorized to divert a maximum combined adjudicated water rights in the amount of 18.11 cubic feet per second (cfs). Information related to the various water rights located on BSRWA is presented in Table 1. Figures 2 and 3 shows the BSRWA's place of use as stipulated in the Shasta River Decree (1932), the Department of Water Resources (DWR) irrigated acreage coverage, and water diversion locations. Prior to the 2009 acquisition of BSRWA by TNC, 1,182 acres were irrigated and all of the water rights were exercised. TNC reduced the number of irrigated acres and the overall diversion rate down to 200 acres and 2.3 cfs respectively. In addition, TNC developed and recorded with the State Water Resources Conservation Board (SWRCB) a California Water Code (CWC) Section 1707 discretionary dedication to allow the consumed portion of the water rights to be preserved instream. The Permittee may only continue to irrigate pursuant to the conditions described in section E.1.a.

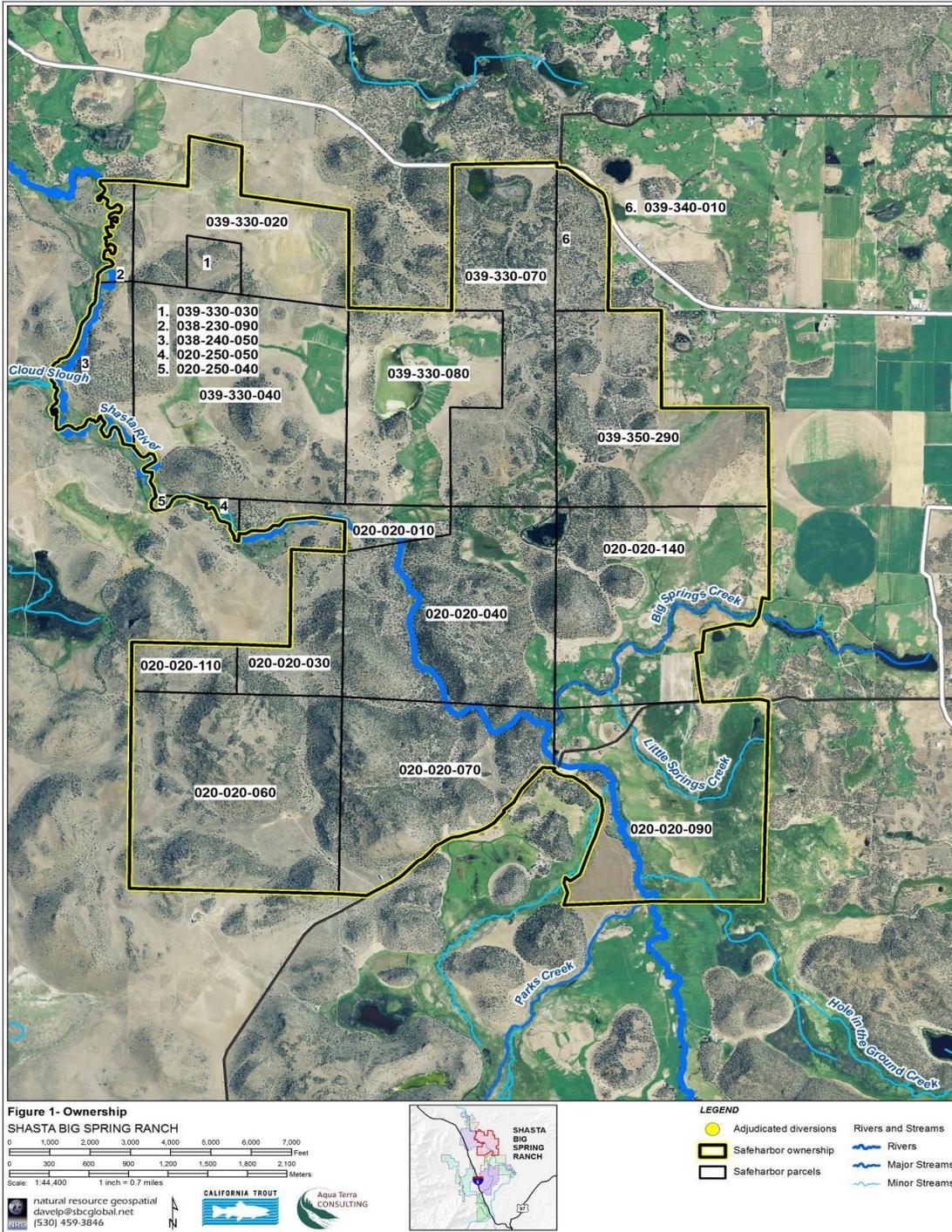


Figure 1 – General Ownership.

Table 1- Summary of Water Rights on the BSRWA per the Shasta River Decree, including water source, period of use and acreage irrigated.

Diversion #	Water Use (cfs)	Description	Season Duration	Total Ac-ft per season	Acreage Irrigated with diversion	Average Days per Season diverted
Adjudicated Irrigation Sources						
167-172	1.5	Hole in the Ground Creek	April 1- Oct 1	536	93.9	180
241	6.71	Big Springs Creek		2396	392.2	
243	4	Little Springs Creek		1428	251.3	
244	0.5	Little Springs Creek		179	17.0	
245	1.15	Little Springs Creek		411	122.0	
246	1.95	Little Springs Creek		696	83.0	
247-248	2.3	Shasta River-Nelson		821	187.4	
TOTAL COMBINED Adjudicated water rights	18.11	Entire BSRWA				
247-248	0.25	Shasta River-Nelson	Oct 1- March 31	Stock water		185

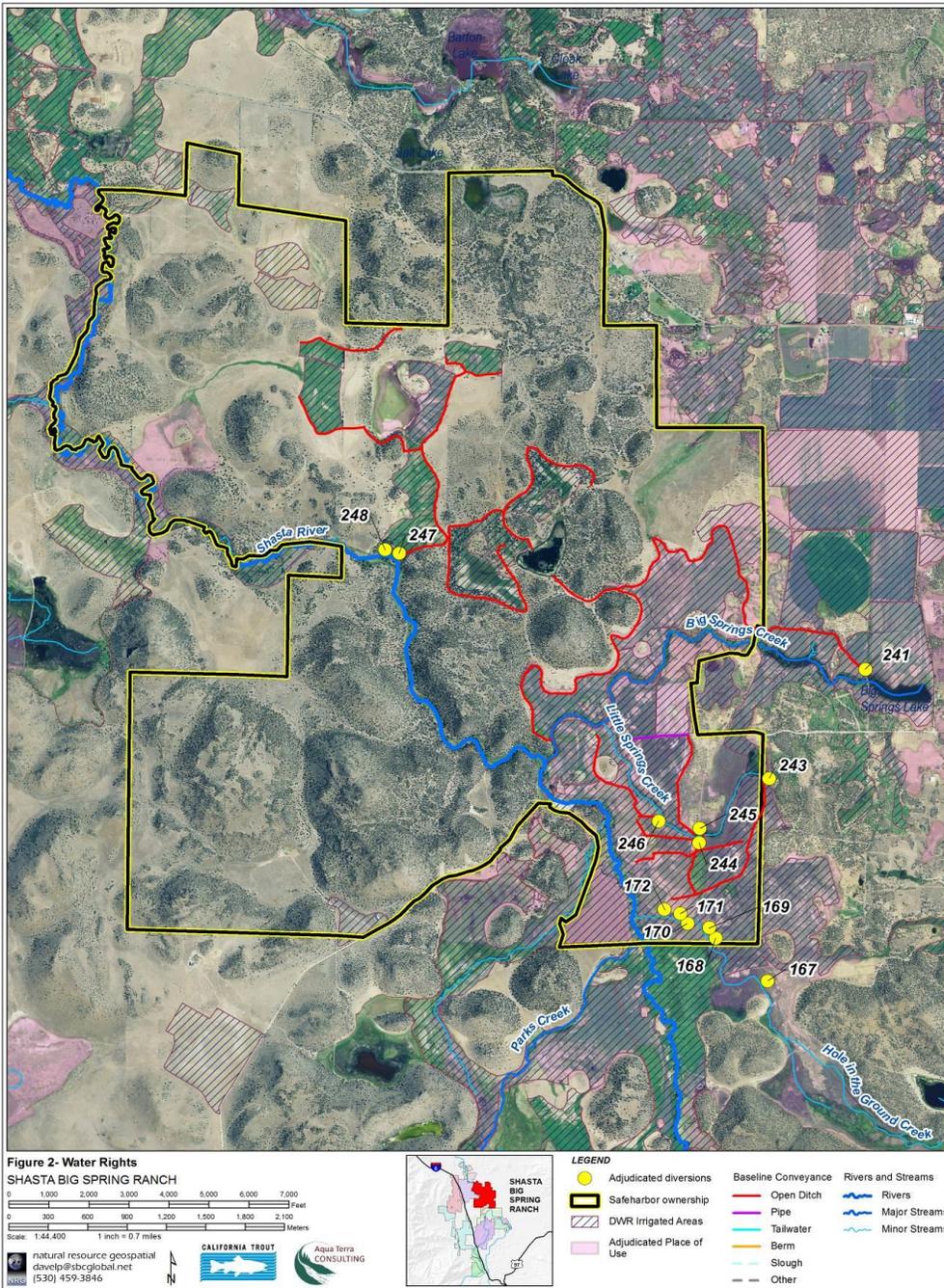


Figure 2-Water Rights

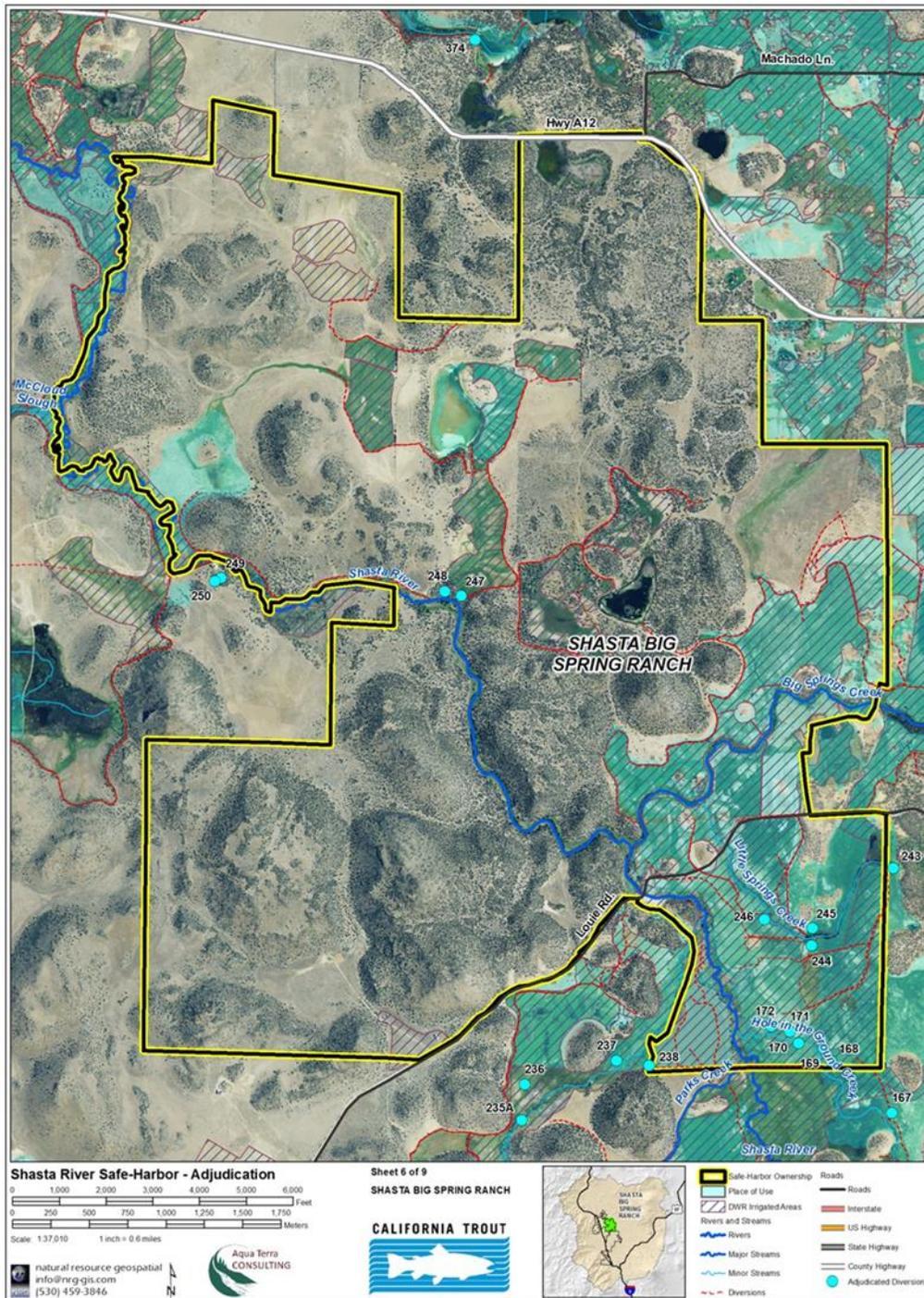


Figure 3- Place of Use and DWR Irrigated Acreage Coverage.

C. Routine Land Use

C.1. Ongoing Routine Land Use

Under the Agreement, the Permittee is authorized to irrigate BSRWA when water temperature thresholds and habitat requirements are met as outlined in Section E.1.a. The potentially flood irrigated acres are currently grass pastures. The water delivery system consists of approximately 2,510 feet of buried mainline with irrigation risers, 230-feet of conveyance pipeline and 100,000-feet of open ditch. There is a 2.5-acre-foot pond used to manage releases of tailwater to Big Springs Creek, described in section E.1.a. Management is based on tailwater temperature and nutrient loading at the pond's headgate.

There are four bridges and three culvert crossings on BSRWA. These crossings do not include the bridge and culvert on Louis Road which are the responsibility of Siskiyou County. No wet stream crossings exist on the ranch, but there are five water lanes and 15 off-channel watering troughs. There are 20 miles of ranch roads that are not paved or rocked and consist of exposed native soils.

Irrigation Management

There are four distinct irrigation units on the BSRWA that may be irrigated using surface water during the term of this Site Plan Agreement: Big Springs, Little Springs, Hole in the Ground, and Nelson.

The Nelson Unit includes approximately 200 acres that are irrigated by a 2.3 cfs water right that is diverted directly from the Shasta River (See Table 1). The diversion is located two miles downstream from the confluence of the Shasta River and Big Springs Creek. It is delivered to fields at the place of use via 1.6 miles of ditch.

The Little Springs Unit Irrigated Pasture Management Area totals 473 acres and is irrigated via Diversion #243 through #246 totaling 7.6 cfs.

The Hole in the Ground Unit Irrigated Pasture Management Area totals 94 acres and is irrigated via Diversion #167 through #172 totaling 1.5 cfs.

The Big Springs Creek Irrigated Pasture Management Area totals 294 irrigated acres. This unit is can be irrigated via Diversion #241 at Big Springs Lake and divert water from Big Springs Lake and delivers the water to Permittee's property boundary approximately 0.6-mile down ditch. Water delivered to this unit . is a maximum of 10 cfs . A Stipulated Judgement describes the rotational system agreed to by TNC and

Irene Busk (Appendix B). The portion of the ditch where it is located on the Enrolled Property is approximately three miles in length.

There are three groundwater wells on the property that are currently not being used. They may be used for domestic or stockwater with no additional restrictions. Prior to the wells being used for irrigation, a hydrogeologic assessment by professional engineer or geologist would be necessary; if the assessment concludes that a well's proposed use rate would substantially affect surface flows, it would not be used for irrigation; if there is no connection to surface water, or no substantial effect on surface flows, the wells may be used. There are also a few solar powered pumps on well that are dedicated stockwater, and may be used with no restriction.

Irrigation Maintenance

Ditch cleaning

Open ditches are prone to clogging with vegetation, which slows the conveyance of water and clogs the buried mainlines. The ditches are not currently being utilized for irrigation. In order to use them they would need to be cleaned to remove vegetation and breaches would need to be fixed most likely, heavy equipment will be necessary. The head works of all the pipelines have grates that would need to be cleaned as needed to keep them functioning properly if in operation. The pipelines and the flood risers would be fully opened to flush the pipes of sediment and algae. This work would be necessary at minimum, annually, and as needed throughout the irrigation season..

Diversion cleaning

The diversion from Big Spring Lake is dependent on spring output and the influence on this spring from up gradient groundwater pumping. Occasionally, the outfall into Big Springs Creek becomes blocked and could limit the Permittee's ability to provide water instream using the CWC §1707. The outfall is located on the adjacent property owned by Irene Busk, (she is *not* a party to the SHA) and the Permittee has access to the outfall for cleaning or maintenance. The diversion at Big Springs Lake is cleaned periodically by the adjacent landowner, mostly using hand tools.

Fish Screen cleaning

The only fish screen on BSRWA is at the Shasta River Diversion (#247/248) on the Nelson Ranch and it is cleaned manually by the lessee's irrigator. The screen is tubular and is cleaned daily when in use. Cleaning and regular maintenance is a requirement under a Grazing Lease Agreement.

Pasture Grazing Management

The BSRWA has 21 distinct pastures where cattle graze. Cattle are rotated through the pastures as part of Permittee's Grazing Lease Agreement for pasture management. The cattle are moved based on several factors, to avoid over-grazing.

Riparian Grazing Management

The riparian corridor on BSRWA has been excluded from cattle from the eight miles of riparian area on the ranch, including approximately five miles of the Shasta River. If the Permittee decides to graze the riparian area, a grazing management plan will be necessary to minimize impacts. Riparian grazing recommendations are included in Appendix D.

Riparian Fence Maintenance

The Permittee's lessees will repair the fence lines as needed. Over ten miles of streams are located on BSRWA, which include portions of the Shasta River, Big Springs Creek, Hole in the Ground Creek, Parks Creek and all of Little Springs Creek. In 2006 and in 2009 TNC excluded livestock from grazing in and along the streams by installing riparian exclusion fencing. Over 14 miles of fence have been installed, excluding over 500 acres of riparian habitat from livestock grazing.

Road Maintenance

The ranch roads onto the Little Spring Unit, along Big Spring Creek and onto the Nelson Unit are not highly used roads and are native materials. Roads will be maintained to allow vehicular access. Maintenance may include placing road base and/or grading, and reshaping to evacuate storm water.

Crossing Maintenance

There are no wet crossings on the ranch, but there are four bridges and three culvert crossings. There are five watering lanes on the Shasta River (Nelson Ranch), which were rocked when the riparian fences were constructed in 2006 and 2012.

The four existing bridges are in varying degrees of condition, with only two being used for vehicular crossings at this time. The Permittee will not do any maintenance on these bridges, unless vehicular crossing is needed or there is a safety issue that must be resolved. There are also three culverts on Little Springs Creek that become blocked on a consistent basis with debris. The culverts are cleaned when needed by hand or with periodic use of heavy equipment depending on extent of blockage.

Herbicide/Fertilizer/Pesticide Use

The use of pesticides is limited to over-the-counter products such as Round-up, Milestone, or Telar. Use is done in accordance with the manufacturer's label

directions for use, for application rates and periods of use to obtain the best response. All usage is conducted under the guidance of the California Department of Pesticide Regulation and under a CDFW licensed pest control advisor. All applications are done by holders of qualified applicators certificates or staff trained by them. Use of herbicides is limited to spot use for the control of yellow star thistle, perennial pepperweed, puncturevine and Dyer's Woad , and other non-native vegetation when other treatments such as mechanical, grazing or burning are not viable or effective.

To control large stands of invasive weeds the Permittee may contract a third party to spray appropriate herbicides such as Roundup or Transline as needed and in compliance with the guidance issued by the California Department of Pesticide Regulation and according to label directions for use. Spot treatments within riparian zones, utilizing chemicals such as Roundup and Telar, or Milestone and Telar, are done by hand utilizing backpack sprayers when necessary, not to exceed 2.6 ounces of Telar per acre. Herbicide will be applied in the late spring or early summer when the plants are bolting. Third party application of herbicides may also occur under County of Siskiyou weed abatement programs of which the Permittee would have no control over type, frequency, method, or location of application, but that would most likely occur along Louie Road.

Grazing permittees may apply nitrogen fertilizer annually to the irrigated pastures at rates not to exceed label recommendations.

Baseline conditions and routine activities are presented in Figure 4.

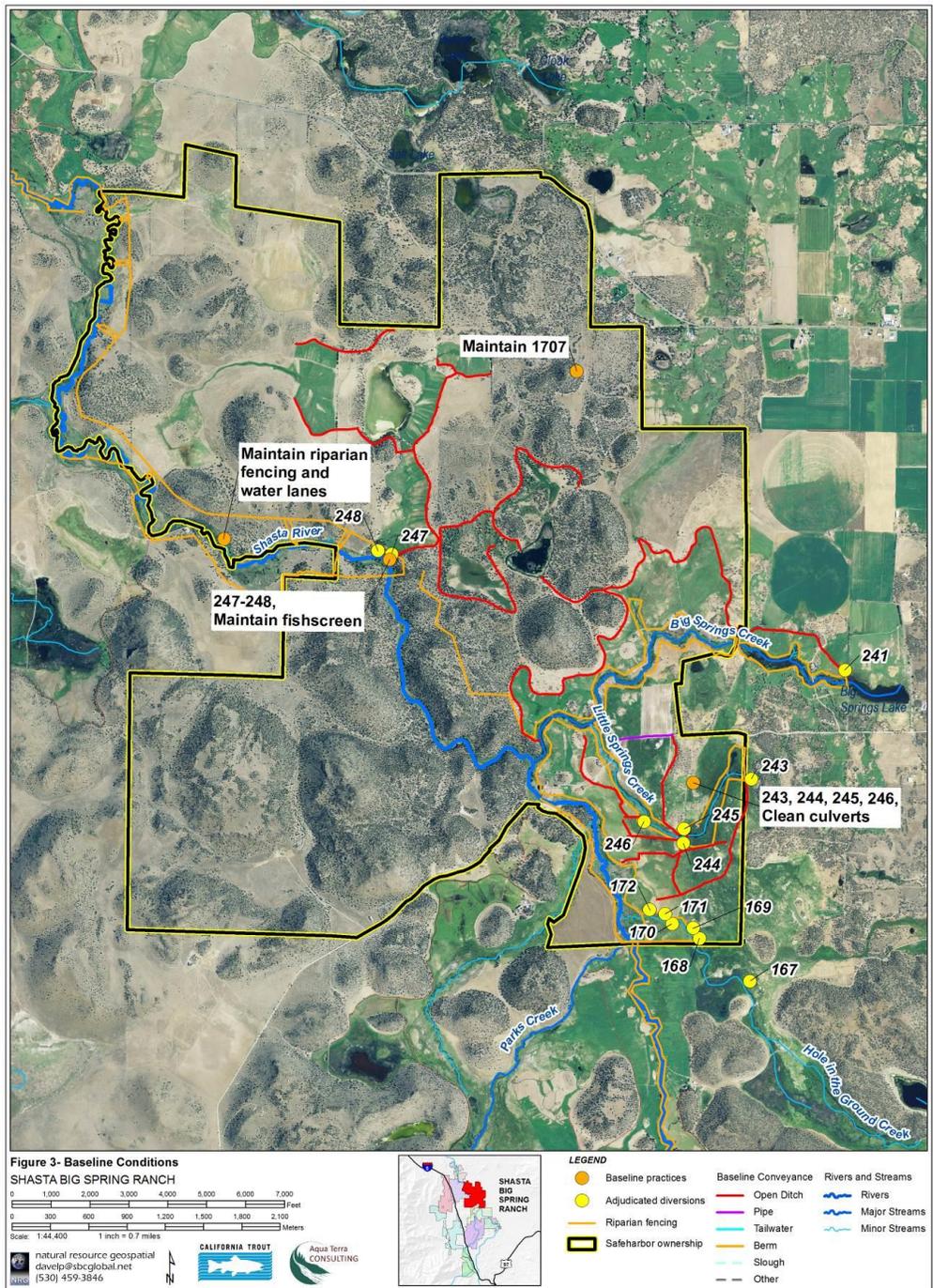


Figure 4. Baseline conditions and routine activities.

C.2. Avoidance and Minimization Measures

The following avoidance and minimization measures (AMM) will be implemented on the BSRWA to reduce impacts associated with the above outlined routine land use activities.

Irrigation Management

If irrigation occurs on the BSRWA, Permittee will implement the following AMMs:

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 descriptions.

A3. Contact NMFS 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.

Irrigation Maintenance

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.

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.

Grazing Management

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.

Fence Maintenance

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.

Road Maintenance

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.

E4. 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.

Crossing Maintenance

Permittee commits to not develop wet crossings on the BSRWA for the term of this Site Plan Agreement.

Herbicide/Fertilizer/Pesticide Use

G1. Ensure that any pesticide or herbicide is handled and applied by a licensed

applicator (when required) in accordance with and 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 Permittee 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 nontarget plants in the riparian area leading to other impacts such as sedimentation. Permittee 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.

Flood Repair

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

H2: NMFS will be notified within 14 days of beginning emergency work.

Public Use

P1: Prior to any consumptive use activities (e.g. hunting or fishing) Permittee will conduct surveys to ensure Covered Species are not present. If Covered Species are present, Permittee will move activities to a new area that does not impact Covered Species.

D. Baseline Conditions and Beneficial Management Activities

Baseline Conditions means the habitat conditions for the Covered Species on the Enrolled Property when NMFS approves this Site Plan Agreement. The Enrolled Property is within the Big Springs Creek and Mid-Shasta Reaches of the Shasta River. Baseline Conditions for the Enrolled Property are the conditions described in Appendix 2 of the Template Safe Harbor Agreement for these reaches of the Shasta River.

Elevated Baseline Conditions are certain Baseline Conditions that are improved because of the implementation of certain Beneficial Management Activities. Elevated Baseline for this Site Plan Agreement are:

- Improved fish passage that will result from providing access for fish passage by implementing culvert removal projects on Little Springs Creek. A total of two culverts will be removed and one will be modified to provide unimpeded fish passage by the Permittee.
- Screening any diversions that Permittee uses for diversion.
- Instream flow based on temperature and habitat criteria.

Table 2 summarizes the Beneficial Management Activities required to maintain Baseline Conditions and to achieve Elevated Baseline Conditions on the Enrolled Property for the term of the Site Plan Agreement. The Beneficial Management Activities implement habitat enhancement actions recommended in the Template Safe Harbor Agreement (Appendix 2) for the Big Springs and Mid-Shasta reaches of the Shasta River.

Table 2- Summary of Beneficial Management Activities

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
Hydrology/Water Quality	<ul style="list-style-type: none"> -Maintain CWC §1707 dedications as described in E.1.a. - Continue to manage tailwater returns as described in E.1a. if needed. - Continue to maintain off-channel stock water troughs as described in Section E.1.a. 		<ul style="list-style-type: none"> -Operate real time water quality monitoring stations to track improvements on the Enrolled Property as described in E.3.a. -Provide easement for the proposed Cardoza pump station as described in Section E.3.a. -Permittee agrees to evaluate and implement if beneficial, HIG Creek channel restoration and/or reconnection projects as described in Section E.3.a. - Based on the results of the above evaluation on HIG Creek the Permittee will either permanently dedicate 1.5 cfs water right

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
			from Hole in the Ground Creek or explore other alternatives as described in Section E.3.a.
Passage/Migration/Screening	<ul style="list-style-type: none"> - Until culverts are removed Permittee agrees to clean clogged culverts along Little Springs Creek as described in Section E.1.b - Operate and maintain the Nelson fish screen when diversion is in use as described in Section E.1.b. 	Remove the two culverts and provided unimpeded fish passage at the third upstream of the County road on Little Springs Creek for fish passage and water quality as described in Section E.2.b.	<ul style="list-style-type: none"> -Implement beaver management as described in E.3.b. -Screen all active diversions
Instream Habitat Complexity	-Leave woody debris from existing trees in place as described in Section E.1.c.		- Implement large wood enhancement on the BSC and Shasta River as specified on Habitat Improvement map and as described in Section E.3.c.

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
			<p>- Implement projects to enhance up to four spring alcoves along the Shasta River as specified on the Habitat Improvement map and as described in Section E.3.c.</p> <p>-Implement projects to build off-channel habitat along the Shasta River, if deemed appropriate, as specified on the Habitat Improvement map and as described in Section E.3.c.</p>

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
Riparian Condition	-Perform yearly maintenance as needed on existing riparian fencing as described in E.1.d.		<p>-Replace 100% of riparian fencing if needed due to flood damage as stipulated in Section E.3.d.</p> <p>-Permittee will eliminate the watering lanes as described in E.1.d.</p> <p>-Implement riparian restoration projects on Little Spring Creek as described in Section E.3.d.</p> <p>- Plant riparian shrub species where determined appropriate, based on soil and groundwater data as described in Section E.3.d.</p> <p>- If riparian grazing occurs, Permittee will implement the riparian grazing plan as described in Section E.3.d and Appendix D.</p>

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
Substrate Quality	-Permittee commits to maintain all riparian fencing as described in Section E.1.e.		- Implement spawning gravel enhancement if deemed appropriate on the Shasta River portion of BSRWA as specified on Habitat Improvement Map and as stipulated in Section E.3.e.
Pasture Management	-Permittee will request that the lessee's cattle continue to be rotated through the six pastures as part of Permittee's pasture management as described in Section E.1.f.		
Assessments/Studies	-Allow the Parties to use data from existing studies on the ranch to further understand Covered Species habitat use on the Enrolled Property. These studies are		- Allow access for studies as described in Section E.3.g. -Maintain water monitoring stations as part of the Effectiveness Monitoring plan and

Habitat Parameter	Net Conservation Benefit Actions		
	Present Day Baseline (Maintain)	Elevated Baseline Condition (Restore)	Other Beneficial Management Activities (Restore; Measures to Avoid and Minimize Impacts)
	summarized in Appendix C. See E.1.g.		provide data to the Shasta Watershed Conservation Group (SWCG) and NMFS.
			The Permittee will allow access for salmonid supplementation and monitoring.
Education/Outreach			Permittee may develop parking areas and install educational/ outreach kiosks as described in Section E.3.h.

E. Description of Beneficial Management Activities

This section provides a detailed description of Conservation and Habitat Enhancement Activities to be implemented on the Enrolled Property for the benefit of the Covered Species. Figures 4 and 5 at the end of this section represent a summary of these actions.

E.1. Actions Required to Maintain Baseline Conditions

This section details the actions required for the Permittee to maintain Baseline Conditions. This includes any land and/or water management activities that are being implemented or have been implemented on the enrolled property that benefit the Covered Species and will be maintained over the duration of the Template Safe Harbor Agreement.

E.1.a. Hydrology/Water Quality

1707 dedications:

-TNC filed California Water Code Section 1707 petitions with the SWRCB in July 2012 with the expressed intent to recognize fish and wildlife preservation and enhancement as a beneficial use of BSRWA water rights, while retaining the beneficial uses of irrigation and stock water . TNC hired Davids Engineering to calculate the consumptive use of the water rights. The consumptive use is the portion of the water right that is evaporated, transpired by plants, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment. To successfully add fish and wildlife as a beneficial use to the property's water rights, TNC showed that such an action would not harm other water right holders. As a result, SWRCB added instream flow as a beneficial use fish and wildlife preservation and enhancement to the water rights on the property (18.11 cfs) but only the consumptively used portion of these water rights can be bypassed downstream of the Montague USGS measuring weir (USGS 11517000) as specified in the Order approved by the SWRCB on May 8, 2014. Table 3 provides a summary of the consumed use calculations of BSRWA water rights that could be expected to be bypassed by the watermaster to the point of compliance (Montague USGS Gage). A Supplemental Decree was filed with the Siskiyou County Superior Court to add fish and wildlife preservation and enhancement as a beneficial use to the BSRWA water rights in in September 2014.

Annually, the Permittee will notify the Shasta Valley Watermaster District of its intent to leave the water rights instream per the Compliance Plan associated with the 1707 petition.

Table 3-Table of Consumed Water for the Enrolled Property.

Diversion Number	Irrigated Area, Acres	Water Right Flow (cfs)	Calculation of Consumed Water (CFS) ¹								Water Source
			Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
167-172	93.9	1.50		0.08	0.55	0.75	0.91	0.79	0.55		Hole in the Ground Creek
241	392.2	6.71		0.34	2.33	3.15	3.80	3.29	2.30		Big Springs Creek
243	251.3	4.0		0.18	1.43	2.02	2.43	2.11	1.48		Little Springs Creek
244	16.95	0.5		0.01	0.10	0.14	0.16	0.14	0.10		Little Springs Creek
245	122.01	1.15		0.09	0.70	0.98	1.18	1.02	0.72		Little Springs Creek
246	82.98	1.95		0.07	0.49	0.67	0.80	0.70	0.49		Little Springs Creek
247-248	187.39	2.3	0.01	0.16	1.11	1.50	1.81	1.57	1.10	0.33	Shasta River
TOTAL CFS	1146.73	18.11	0.01	0.93	6.70	9.21	11.10	9.61	6.73	0.33	

¹ Blank cells indicate that there are no water rights in that month

Diversion management Plan:

-Most of the source water associated with the BSRWA water rights are cold water springs that are highly valuable to Coho Salmon in particular and to the Shasta River Watershed in general (RWQCB TMDL).

-Permittee Irrigation Management

- Continue Nelson Ranch irrigation from the Shasta River.
- Divert Hole in the Ground (HIG) Creek tail water return if water quality conditions are detrimental to salmonids (e.g. temperature above 18 degrees C).
 - Permanently dedicate the HIG Creek water right to instream fish and wildlife beneficial use if restoration actions are successful.
- Little Springs Creek may be diverted from the spring if both of the following are met: 1) water temperature in Little Springs Creek is 16 degrees Celsius or less at the confluence with Big Springs Creek; and 2) culverts are removed.
 - Permanently dedicate water rights necessary to achieve the temperature criteria for Little Springs Creek.
- Water from Big Springs Lake may be diverted if both of the following are met: 1) water temperature in Big Springs Creek at the confluence with Shasta River is 18 degrees Celsius or less; and 2) salmonid habitat flow criteria in the Shasta River Canyon reach are met for upstream adult passage and downstream juvenile passage.
 - Permanently dedicate water rights necessary to achieve the two criteria above for Big Springs Creek and the Shasta River Canyon reach in all months.
- Water availability for future irrigation on the property will be based on the following.
 - 16 °C or less at the confluence of Little Springs Creek and Big Springs Creek.
 - 18 °C or less at the confluence of Big Springs Creek and Shasta River.
 - Once a temperature threshold is met, diversions from that water source will cease for that irrigation season.
 - Juvenile emigration and adult migration flow needs within the canyon reach of the Shasta River.

- Juvenile rearing temperature and flow conditions needed in the Shasta River below Big Springs Creek.
- Permittee may irrigate in the winter for ground water recharge and to enhance wildlife habitat if legally allowed to do so.
 - Winter irrigation will be minimal and not impact temperature or habitat requirements.

Tailwater Reduction

-If irrigation occurs within the Big Springs Unit, and if tailwater measurably affects stream temperature (i.e., changes stream temperature by more than 0.1 degrees Celsius from upstream to downstream), Permittee will continue to manage the tailwater capture pond installed within the Big Springs unit to prevent tailwater coming from upslope pastures from entering Big Springs Creek. The pond is equipped with temperature monitoring stations that inform the Permittee when the temperature of the water is suitable to return into Big Springs Creek. Tailwater that is warmer than the creek is held in the pond until its temperature is the same or lower than Big Springs Creek water.

-When not irrigating, the Permittee will close the head gate after the spur ditch heading to Bass Lake to mitigate for any tailwater that may travel on to the property from adjacent properties.

Off-Channel Stock watering

-Permittee commits to maintain the existing off-channel stock water system if livestock are present.

E.1.b. Passage/Migration/ Diversion Screening

Little Springs Culverts

- The culverts on Little Springs Creek frequently become plugged with debris, blocking flow, impounding water, increasing water temperatures, degrading water quality and impeding fish passage. The Permittee commits to continuing to monitor and to unplug culverts on Little Springs Creek on an as needed basis until the culverts are removed. Permittee plans to remove the two upper culverts and provide unimpeded passage at the third to reduce thermal loading and provide fish passage. This is further addressed in Section E.2.b

Diversion Screens

- Permittee will evaluate the Nelson Unit diversion fish screen and make sure it meets NMFS fish screen criteria. If it does not meet criteria, Permittee shall install a new fish screen within one year from the signing the Agreement. If it does meet criteria, the Permittee will maintain the Nelson Unit fish screen when the diversion is in use.

-Permittee will screen all active diversions.

E.1.c. Instream Habitat Complexity

Large Woody Debris

-Natural woody debris from existing trees along the banks throughout the property will be left in place for refugia.

E.1.d. Riparian Condition

Riparian Fencing

-Riparian exclusion fencing has been completed for the entire ranch, excluding cattle from entering the riparian areas. This action has resulted in restored aquatic vegetation and improved bank stabilization. The Permittee commits to maintain all riparian fencing into the future if livestock is present.

Crossings

-The Permittee commits to eliminate the five (5) water lanes to reduce negative impacts to the watercourse and replaced with alternative stock water systems. No additional crossings will be developed during the term of the Template Safe Harbor Agreement.

E.1.e. Substrate Quality

Riparian Fencing

-Riparian exclusion fencing has been completed for the entire ranch, which benefits substrate quality due to more stable banks. Permittee commits to maintain all riparian fencing into the future if livestock is present.

E.1.f. Pasture Management

The Permittee may utilize existing pasture units for cattle grazing as an adaptive management tool for enhancing wildlife habitat.

E.1.g Assessments/Studies

See Appendix C for a list of studies that have been done that can be used to analyze net conservation benefit.

E.2. Actions Required to Achieve Elevated Baseline Conditions

This section details the actions required to achieve and maintain Elevated Baseline conditions. This includes any land and water management activities that will be implemented and maintained on the enrolled property to improve unsuitable habitat conditions for the Covered Species for the duration of the Template Safe Harbor Agreement.

E.2.a. Hydrology/Water Quality

Irrigation efficiency:

-If long-term irrigation is planned, Permittee will develop a comprehensive, long-term plan for improving irrigation infrastructure and management practices that will continue to diminish any adverse effects on the conservation values that arise from the water diversion, water conveyance, and the means used to apply water.

E.2.b. Passage/Migration/ Diversion Screening

Little Spring Creek Passage

-The culvert on Little Spring Creek at Louie Road is a partial passage barrier to fish. Siskiyou County has funding to replace this culvert with a larger one to reduce impoundment upstream on Little Springs Creek. This project will enhance fish passage to over one mile of habitat on Little Springs Creek. Permittee will provide access as needed to implement the project and tracking general project schedule.

Permittee plans to remove the two culverts and provide unimpeded fish passage at the third upstream of the County road on Little Springs Creek for fish passage and water quality benefits within 3 years of signing this agreement.

E.2.c. Instream Habitat Complexity

The Permittee will continue existing management practices that protect instream habitat complexity and does not propose additional actions at this time.

E.2.d. Riparian Function

The Permittee will continue existing management that protects riparian function. Permittee will eliminate the watering lanes and replace with alternative stockwater systems within three years.

E.2.e Substrate Quality

The Permittee does not propose additional actions currently.

E.2.f. Pasture Management

The Permittee may continue existing pasture management and does not propose additional actions at this time.

E.2.g Assessments/Studies

The Permittee will allow access for studies related to the covered species and will provide data from existing studies but does not propose additional actions at this time.

E.3. Other Beneficial Land and Water Management Activities

This section summarizes any other land and water management activities that will be implemented on the enrolled property to benefit the Covered Species.

E.3.a. Hydrology/Water Quality

Thermal, Stage and discharge monitoring

-Permittee commits to maintaining the real-time system and archive real-time data on water temperature and flow at locations described in Table 4 for the term of this agreement.

Table 4 – Water Quality Monitoring Stations.

Location	Name	Parameters
Shasta River above Big Springs Creek	SRBSC	Temperature (RT)
Big Springs Creek at Water Wheel	BSCWW	Flow and Temperature (RT)
Big Springs Creek at mouth	BSCM	Temperature (RT)
Little Springs Creek	LSC	Flow and Temperature
Hole in the Ground Creek	HGC	Temperature
RT = realtime		

Upgrade diversion facilities:

-The shared management of the water right on Big Spring Lake causes some fluctuation in stream flow that could impact fisheries in Big Springs Creek. The Permittee and the neighboring landowner have agreed to a detailed Stipulated Judgment to share the diversion over the irrigation season based on certain criteria. ..

-The Cardoza Ranch (an adjacent property owner and SHA Permittee) has a fish passage barrier on Parks Creek, that will be alleviated by moving the point of diversion to the Shasta River on the Permittee's property upstream of the Louie Road Bridge. The Permittee will provide an easement for the proposed Cardoza pump station and all associated infrastructure upstream of the Louie Road bridge. The implementation schedule for this action is currently estimated to occur within 2 years of the signing of this Site Plan Agreement. This action will ensure passage to more than 12 miles of Parks Creek habitat. The funding for this activity has been secured.

Hole in the Ground (HIG) Creek:

Water entering BSRWA from Hole in the Ground (HIG) Ranch via HIG Creek can possess elevated water temperatures (consistently over 20 °C) and significant discharge (up to 6.5 cfs) during the irrigation season due to off ranch activities outside the control of the Permittee. This water often has a negative impact to the Mid Shasta Reach and as conditions improve in the Mid Shasta Reach, this impact could be more significant. There are also cool, diffuse springs, and known habitat for Coho Salmon, near the mouth of HIG, which could also be impacted by upstream discharges. Permittee will prepare a feasibility analysis to identify enhancement and restoration opportunities in coordination with the adjacent landowner on HIG Creek. These opportunities may include enhancement of channel form and riparian vegetation, channel relocation, riparian fencing, reducing water temperatures, eliminating fish passage barriers, and comprehensive restoration of the entire reach of HIG Creek. This analysis will occur within 5 years of the signing of this Site Plan Agreement.

Depending on the results of the evaluation on HIG Creek identified above and contingent on an approved SHA with Hole in the Ground Ranch, the Permittee will implement one of the following actions to ensure thermal impacts from this water source are minimized:

a) If deemed feasible and beneficial to the Covered Species, the Permittee

commits to designing, permitting and implementing restoration of HIG Creek on BSRWA. Upon completion of restoration activities (on both BSRWA and HIG Ranch) and if said activities address the water quality issues associated with this water, then the Permittee agrees to change the existing *permissive* CWC §1707 dedication of water rights associated with HIG Creek to a permanent dedication for the purposes of instream beneficial use. This would include the submission of necessary notifications to the Scott and Shasta Valley Watermaster District that describes the intent to dedicate these water rights instream permanently. If implemented, the project could restore two miles of habitat on HIG Creek; or

b) If the above enhancement proposal is deemed infeasible and/or if HIG Creek water is still deemed an impact to the Upper Shasta Reach or the spring near the HIG mouth, alternatives shall be explored to keep the HIG water from entering the Upper Shasta Reach. If a feasible project can be developed, Permittee will pursue the project.

The completed implementation schedule of this action is currently estimated to occur within five years of the signing of this Site Plan Agreement, contingent on funding and permitting.

E.3.b. Passage/Migration/ Diversion Screening

Beaver management

-Beaver dams have been documented on Permittee's property and will not be discouraged if the beaver activity does not inhibit use of head gates or crossings. If infrastructure may be impacted by beaver activity, actions may be taken to dissuade dam building at that location.

E.3.c. Instream Habitat Complexity

Alcove Enhancement

-Permittee commits to the enhancement of up to four existing spring alcoves along the Shasta River adding up to five Large Woody Debris (LWD) structures for cover as designated on the Habitat Improvement map. The locations of these alcoves are shown in Figure 5. Permittee will install LWD from upland sources of juniper. The implementation schedule of this project is estimated to occur within five years of the signing of this Site Plan Agreement. These activities will be combined with other habitat improvement projects on Big Springs Creek and Mid-Shasta reaches.

Large Woody Debris

-Permittee commits to implementing a pilot LWD project on Big Springs Creek

(BSC), which could include the construction of post-assisted complex wood structures within a 1,000-foot reach of channel as designated on the Habitat Improvement map. After the evaluation of the effectiveness, additional stretches of BSC may be treated with up to 40 structures installed. The total number of structures installed will be based on adaptive management and lessons learned as structures are installed. Permittee will design, permit and implement the project, and provide LWD from upland sources of juniper. The implementation schedule of this project is currently estimated to occur within 55 years of the signing of this Site Plan Agreement.

-Permittee commits to the placement of LWD bank stabilization along the Mid Shasta Reach in cooperation with adjacent property owners as designated on the Habitat Improvement map. The project would entail the placement of LWD structures on outside bends of meanders to provide cover and stabilize eroding banks. Permittee commits to design, permit and implement the project, and provide LWD from upland sources of juniper. The implementation schedule of this project is currently estimated to occur within five years of the signing of this Site Plan Agreement.

Off Channel Habitat

-Permittee commits to connecting to three disconnected oxbows within the Mid Shasta reach as designated on the Habitat Improvement map, if deemed appropriate. This would entail excavation to reconnect the oxbow, installing LWD in channel to provide sweeping velocities to keep oxbow connected and installing one LWD structure for every 50-feet of bank within the newly constructed off channel habitat for cover. Permittee commits to design, permit and implement the project, and provide LWD from upland sources of juniper. The implementation schedule of this project is currently estimated to occur within five years of the signing of this Site Plan Agreement

E.3.d. Riparian Function

Existing Riparian Fencing

-Replace 100% of riparian fencing if needed due to flood damage if grazing will occur.

Existing Riparian Planting

Within the fenced areas (exclusion zones), efforts to establish riparian trees have been taken throughout the riparian zone. The plantings will be monitored, weeded

and planting cages removed as necessary.

Big Springs Creek Riparian Restoration

-Permittee may plant riparian species in areas where suitable environmental conditions occur, if deemed appropriate. The implementation schedule of this project is estimated to occur within 10 years of the signing of this Site Plan Agreement

Revised Riparian Grazing Management plan:

-If the riparian exclusion zone is grazed, the Permittee agrees to adhere to the Riparian Grazing Management in Appendix D.

E.3.e Substrate Quality

Gravel Placement

-Permittee commits to the placement of a gravel stockpile on the Shasta River as designated on the Habitat Improvement map, if a gravel distribution analysis determines that it is appropriate. Permittee agrees to evaluate gravel placement as a potential habitat enhancement tool in the Shasta River. The implementation schedule of this project is currently estimated to occur within five years of the signing of this Site Plan Agreement. These activities will be combined with other habitat improvement projects on Mid- Shasta reaches.

E.3.f. Pasture Management

None

E.3.g Assessments/Studies

-Permittee commits to continue to allow research entities such as UC Davis, SVRCD, USFWS, NMFS and others to conduct studies to describe salmonid habitat conditions, life history requirements, and productivity to help inform efforts to improve survival and productivity of Coho Salmon in the future, as long as they have the appropriate permits and follow the existing protocols for obtaining approval to conduct studies on State property.

-Permittee will allow for access to perform riparian grazing management evaluation plots on BSRWA if riparian grazing occurs.

E.3.h. Public education/outreach

The Permittee may develop up to eight gravel surfaced parking areas for public access, education and outreach opportunities. Educational kiosks will be installed at some locations for public access and viewing. Parking areas will be located a minimum of 100 feet from watercourses and will be designed so drainage will not discharge to watercourses.

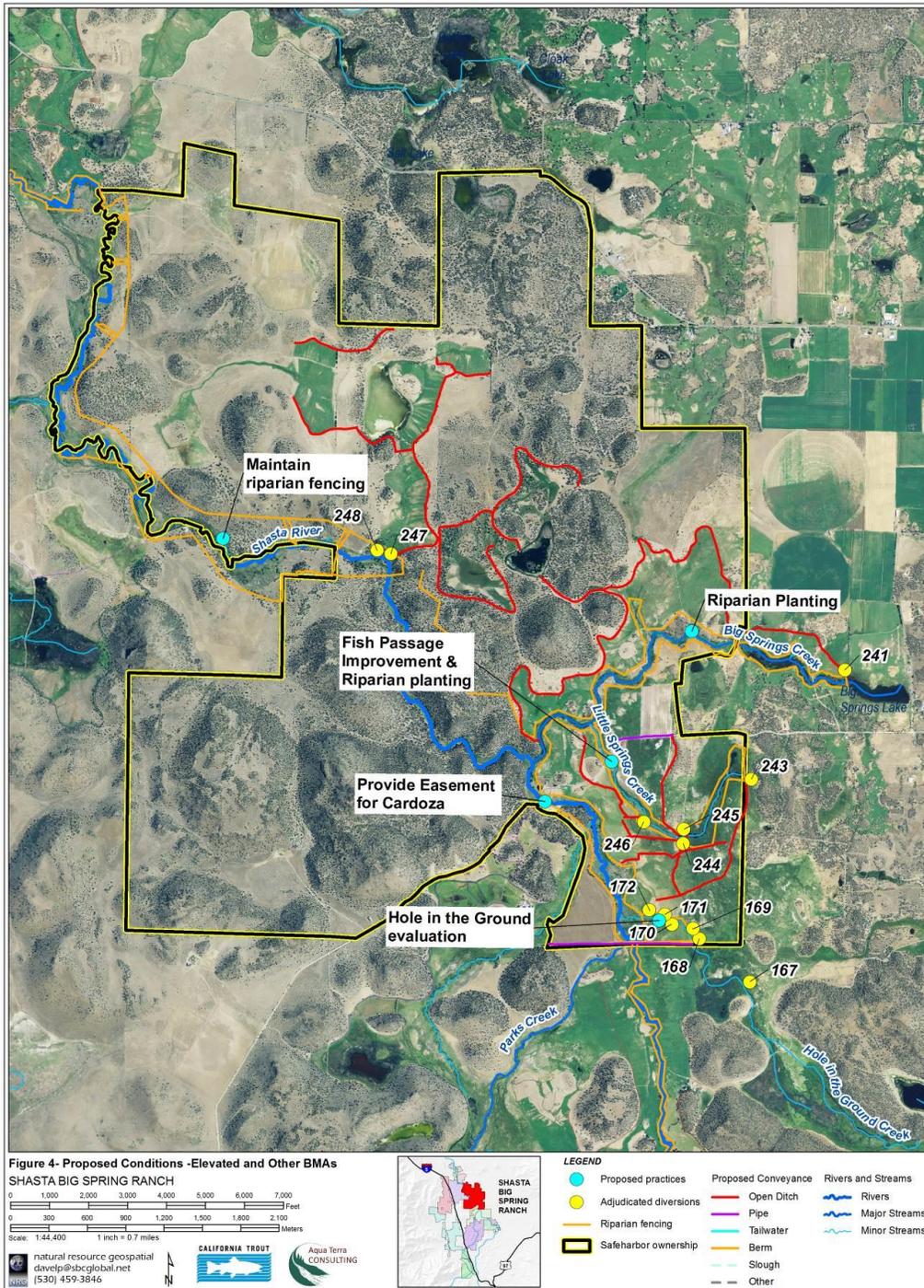


Figure 4. Beneficial Management Activities.

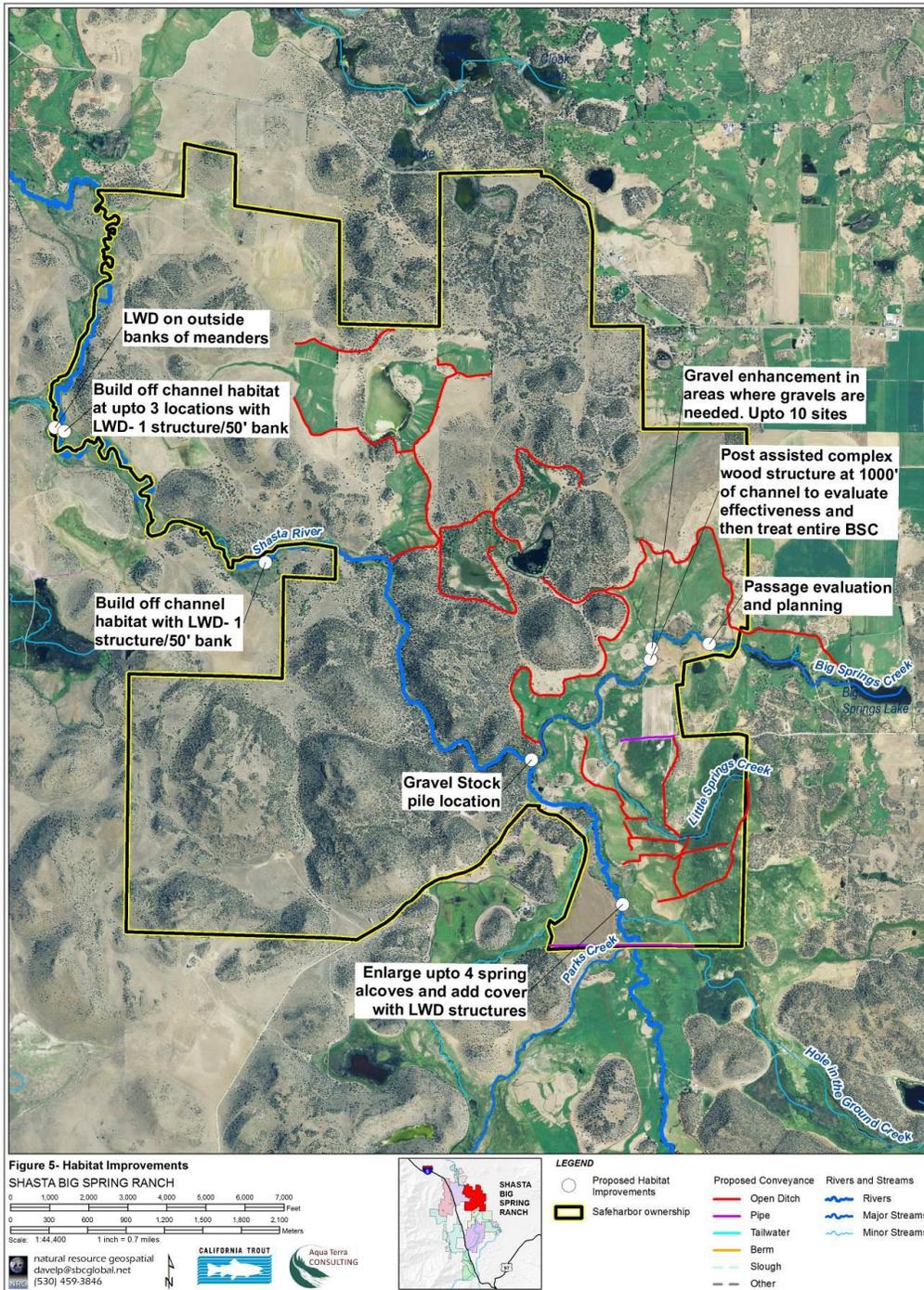


Figure 5. Beneficial Management Activities – Instream Habitat.

F. Effective Date and Term of the Site Plan Agreement

F.1 This Site Plan Agreement will be effective when signed by NMFS and the Permittee for the Enrolled Property. Its term will be the same as the term of the Template Safe Harbor Agreement.

F.2 The Permit will be effective when issued by NMFS. Its term will be the same as the term of the Template Safe Harbor Agreement.

G. Monitoring and Reporting (who, what, when, where)

G.1. Avoidance and Minimization Monitoring Commitments

Covered Activity	Shasta Big Spring Ranch - AMM	AMM Monitoring Technique
Irrigation Management	A1	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. -When construction or repair work is being done, three to five photo points will be taken, or an annual agency inspection can be requested.

Covered Activity	Shasta Big Spring Ranch - AMM	AMM Monitoring Technique
Irrigation Maintenance	<p>B1 B2 B5</p>	<p>All maintenance of instream irrigation facilities shall be monitored. Following are some examples of protocols:</p> <p>-Log of maintenance activities carried out within the calendar year be included in the yearly SHA report.</p>
Riparian Grazing Management	<p>C1 C2</p>	<p>Riparian grazing management shall be monitored as follows:</p> <p>-An appropriate number of 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.</p> <p>-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 because of monitoring results including management criteria used to determine the time to move livestock out of the riparian pasture.</p>

Covered Activity	Shasta Big Spring Ranch - AMM	AMM Monitoring Technique
	C3	-NMFS may initiate periodic inspection of grazed riparian pastures to ensure riparian grazing management plan is effective. -Annual Redd Survey report
Fence Maintenance	D1 D2	-A short description of fence maintenance activities will be included in the annual report template.
Road Use and Maintenance	E1 E2 E3 E4	- A short description of annual road maintenance activities will be included in the annual report.
Herbicide/Fertilizer/ Pesticide Use	G1 G2 G3 G4 G5	- Permittee commits to log use of herbicide, fertilizer and pesticide activities carried out within the calendar year be included in the annual report.
Flood Repair	H1 H2	- Permittee shall take photographs of the emergency site repairs and a detailed description of the repairs to be included in the annual report.

G.2 Implementation and Effectiveness Monitoring Commitments

Habitat Parameter	Net Conservation Benefit Actions	Implementation Monitoring Technique	Effectiveness Monitoring Technique
<p style="text-align: center;">Hydrology/Water Quality</p>	<ul style="list-style-type: none"> -Maintain diversions and 1707 dedications as described in E.1.a. - Continue to manage tailwater returns as described in E.1a. if needed. - Continue to maintain off-channel stock water troughs as described in Section E.1.a. -Continue acceptable diversion management plan as described in Section E.2.a. -Operate real time monitoring at stations to track improvements on the Enrolled Property and on an associated reach as described in E.3.a. -Clear Big Springs Lake outfall culvert and add a monitoring device to outfall as described in E.3.a. -Provide easement for the proposed Cardoza pump station as described in Section E.3.a. 	<ul style="list-style-type: none"> - An appropriate number of photo points will be established documenting functioning stockwater system, diversion - Data from measuring devices will be included in the annual SHA report -Written easement will be submitted with annual report. 	<ul style="list-style-type: none"> - Water monitoring stations will be maintained. Provide yearly data to NMFS and SWCG

Habitat Parameter	Net Conservation Benefit Actions	Implementation Monitoring Technique	Effectiveness Monitoring Technique
	<p>-Evaluate whether to continue to operate the diversion on Big Spring Lake at its current point of diversion and quantity as described in Section E.1.a.</p> <p>-Evaluate HIG creek channel restoration and/or reconnection projects as described in Section E.3.a.</p> <p>- Based on the results of the above evaluation on HIG Creek the Permittee will either permanently dedicate 1.5 cfs water right from Hole in the Ground Creek or explore other alternatives as described in Section E.3.a</p>	<p>-Provide HIG Creek evaluation for restoration project.</p> <p>-If dedication happens, provide paper work or communication to water master district to change the permissive to permanent dedication.</p>	
Passage/Migration/ Screening	<p>-Until culverts are removed Permittee agrees to clean clogged culverts along Little Springs Creek as described in Section E.1.b</p> <p>- Maintain the Nelson Unit fish screen when diversion is in use as described in Section E.1.b.</p>	<p>- An appropriate number of photo points will be established to document culvert replacement/removal project on Little Springs construction and fish screen maintenance on Nelson Unit.</p> <p>-Water measuring protocol that is in concurrence with SB88 at new point of diversion.</p>	

Habitat Parameter	Net Conservation Benefit Actions	Implementation Monitoring Technique	Effectiveness Monitoring Technique
	<ul style="list-style-type: none"> -Implement fish passage projects on Little Springs Creek as described in Section E.2.b. -Implement beaver management as described in E.3.b. 	<ul style="list-style-type: none"> - An appropriate number of photo points will be established to document culvert replacement/removal project on Little Springs construction and fish screen maintenance on Nelson Unit. 	
Instream Habitat Complexity	<ul style="list-style-type: none"> -Continue to leave woody debris from existing trees in place as described in Section E.1.c. -Implement large wood enhancement on the BSC and Shasta River as specified on Habitat Improvement map and as described in Section E.3.c. -Enhance up to four spring alcoves along the Shasta River as specified on the Habitat Improvement map and as described in Section E.3.c., if deemed appropriate. -Build off-channel habitat along the Shasta River as specified on the Habitat Improvement 	<ul style="list-style-type: none"> -An appropriate number of photo points will be established documenting habitat improvements 	

Habitat Parameter	Net Conservation Benefit Actions	Implementation Monitoring Technique	Effectiveness Monitoring Technique
	map and as described in Section E.3.c., if deemed appropriate.		
Riparian Condition	<ul style="list-style-type: none"> -Will continue to perform yearly maintenance as needed on existing riparian fencing as described in E.1.d. -Consider planting additional riparian species along and in Big Springs Creek as described in Section E.3.d. - If riparian grazing occurs, Permittee will implement the riparian grazing plan as described in Section E.3.d and Appendix D. 	<ul style="list-style-type: none"> - Establish an appropriate number of photo points to document riparian grazing area and crossing and stockwater systems in proper function. 	<ul style="list-style-type: none"> -Survival rates of riparian planting will be reported by Permittee to NMFS for a minimum period of 3 years after planting occurs.
Substrate Quality	<ul style="list-style-type: none"> -Permittee commits to maintain all riparian fencing as described in Section E.1.e. - Evaluate gravel enhancement on the Shasta River portion of BSRWA as specified on Habitat Improvement 	<ul style="list-style-type: none"> - An appropriate number of photo points will be established to document gravel augmentation. 	

Habitat Parameter	Net Conservation Benefit Actions	Implementation Monitoring Technique	Effectiveness Monitoring Technique
	Map and as stipulated in Section E.3.e.		
Pasture Management	-Permittee will require lessee to rotate cattle through the pastures as part of Permittee’s pasture management as described in Section E.1.f.	- An appropriate number of photo points will be established to document pasture condition.	
Assessment/Studies	<p>--Allow the Parties to use data from existing studies on the ranch to further understand Covered Species habitat use on the Enrolled Property. These studies are summarized in Section E.1.g and Appendix C.</p> <p>- Allow access for studies as described in Section E.3.g.</p>	-Reports of new studies will be written/summarized/obtained and provided in the annual report	-Maintain tag arrays and trap and tag fish as feasible.

H. Annual Report and Adaptive Management

The Permittee will complete an Annual Report yearly and report as stipulated in the Template Agreement.

I. Regulatory Assurances (NMFS’ section - see example below)

“Upon execution of this Agreement by the Parties, and the satisfaction of all other applicable legal requirements, NMFS will issue a permit under Section 10(a)(1)(A) of the ESA to assure the Permittee may incidentally take Covered Species, in accordance with the Site Plan and Agreement, as a result of Routine Land Use and Beneficial Management Activities as described

in each Agreement, and except where such Routine Land Use would result in the diminishment or non-achievement of the Baseline and/or Elevated Baseline Conditions established for the enrolled property. This assurance depends on the Permittee maintaining the Baseline and/or achieving the Elevated Baseline Conditions set forth in the Site Plan, complying fully with the Agreement and their Site Plan, and so long as the continuation of Routine Land Use and Beneficial Management Activities would not be likely to result in jeopardy to Covered Species or the adverse modification or destruction of their designated critical habitat. NMFS provides no assurances with regard to any action that may affect Non-Covered species, including the take of Non-Covered Species and the adverse modification or destruction of their designated critical habitat.

J. Signatures of NMFS and the Permittee

CDFW

Date

NMFS

Date

Appendix A- Legal Deeds and Busk Settlement

Appendix B- Busk Stipulated Judgement

Appendix C- List of Existing Assessments and Studies

Working title/topic	Deliverable, product, report, paper	Strategic purpose, associated data	Authors; key collaborators	Full citation
Spawning gravel surveys	report to CDFW	survey to determine locations and extent of suitable spawning gravels for salmonids in the Shasta River	McBain and Trush	
Genetics workshop for Shasta coho	workshop	Two day meeting to consider the genetic diversity of the coho in the Shasta in relation to that in other tributaries and the hatchery. Important consideration in the discussion of coho supplementation	organized by Amy Campbell	
Ecological trap for coho in the Shasta River	peer reviewed publication	Discussion of the effects of choices in coho spawning locations in the Shasta and their implications for the growth and survival of juveniles during over-summering.	Jeffres et al.	Jeffres C, Moyle PB. 2012. When Good Fish Make Bad Decisions: Coho Salmon in an Ecological Trap. North American Journal of Fisheries Management. 32:87-92
Growth and survival of juvenile coho salmon along a thermal and productivity gradient in the Shasta River	PhD dissertation	penned coho were positioned at 5 different distances from the cold, nutrient rich springs that feed the Shasta. The fishes' growth and survival were assessed across a gradient of temperature and food availability	Rob Lusardi	
Habitat use and behavior of Juvenile coho in Big Springs Creek, the Shasta and Salmon Rivers	report to funders and probable peer-reviewed paper.	snorkel surveys will be conducted to assess habitat use and movement behavior along a thermal and productivity gradient	Joshua Strange, Stillwater Consulting	
Instream flow studies	report to CDFW	study to define minimum and desired instream flow targets for salmonids in the Shasta River	McBain and Trush	
Nelson Ranch Baseline Documentation Report	report	Baseline documentation of the physical, biotic and built environment of Nelson Ranch	John Dittes, Dittes and Guardino Consulting	
Shasta Big Springs Ranch Easement Documentation Report	report	Baseline documentation of the physical, biotic and built environment of Shasta Big Springs Ranch	John Dittes, Dittes and Guardino Consulting	
Improving Managed Environmental Water Use: Shasta River Flow and Temperature Modeling	PhD dissertation		Null	http://www.waterplan.water.ca.gov/docs/cwpm2009/0310final/v4rcl0a05_cwp2009.pdf
Little Springs Shallow ground water piezometers	technical memorandum	Monitoring of shallow ground water to understand interactions with irrigation practices.	Fowler and Babcock.	
Shasta Big Springs Ranch Big Ditch Infiltration Technical Memo	Internal TNC report for NOAA-ARRA	Part of the NOAA assessment of irrigation efficiency	H2O Tech and Aquaterra	
Within and among year variation in groundwater elevations	reports	Ongoing monitoring to understand effect of irrigation from groundwater on groundwater levels, with Buck dissertation modeling groundwater pools and fluxes in the the Pluto's Caver aquifer.	Fowler and Babcock. Buck	C. Cornell-Buck 2013. Managing Groundwater for Environmental Stream Temperature. UC Davis dissertation. A. C. Fowler. 2010 Technical Memorandum. Ground water monitoring on Shasta Big Springs Ranch
Groundwater database		Multi-year database on groundwater levels from Shasta Big Spring Ranch wells	Babcock and Fowler	
Irrigation monitoring database		Multiple year database on water use for irrigation	Babcock and Fowler	
Effects of late season irrigation deficits on pasture productivity and quality	report, spring 2015, peer reviewed paper #5	Assessment of the effects on pasture quality and productivity with early cessation of irrigation will be examined to inform water use and quantify costs to ranchers	Steve Orloff, Chris Babcock, Amy Campbell,	
Shasta Basin Monitoring plan: a multi-scale, science approach to support conservation activities in the Shasta Basin	Monitoring Plan		Willis, Deas, Nichols and Jeffres	

Working title/topic	Deliverable, product, report, paper	Strategic purpose, associated data	Authors; key collaborators	Full citation
2014 temperature assessment of coho habitat	report	comparison of 2014 thermal conditions with those of previous years during projected large juvenile coho cohort	Jeffries, Nichols, Willis	
Little Springs Creek baseline assessment	reports	Geomorphology, flow, thermal profile, vegetation, stream insects, and fish use of Little Springs Creek	TNC, CDFW, UCD, Watercourse	
Shasta River 2007 Year-in-the-Life	report	Collect information on the physical habitat, water flow and quality, nutrient flux, food web structure and fish use of the Nelson Reach of the Shasta River (water year 2007) to guide restoration management decisions.	Carson Jeffries, J. Mount, P. Moyle, A. Nichols, R. Dahlgren, A. King, M. Deas, et al.	Jeffries C, Mount JF, Moyle PB, Deas M, Buckland E, Hammock B, Kie man JD, King AM, Kingbaum N, Nichols AL et al. 2007. Baseline Assessment of Salmonid Habitat and Aquatic Ecology of the Nelson Ranch, Shasta River, California Water Year 2007.
Big Spring Creek and Shasta assessment	report	Results from baseline studies of the Busk property during the 2008 "option to buy" period.	Jeffries et al.	Jeffries C, Dahlgren RA, Kie man JD, King AM, Lusardi RA, Nichols AL, Null SE, Tanaka S, Willis AD, Mount JF et al. 2009. Baseline Assessment of Physical and Biological Conditions Within Waterways on Big Springs Ranch, Siskiyou County, California.
Shasta Big Springs Ranch restoration assessment	report	Assessment of restoration actions on Shasta Big Springs Ranch.	Jeffries et al.	Jeffries C, Nichols AL, Willis AD, Mount JF, Moyle PB, Deas M. 2010. Assessment of Restoration Actions on Big Springs Creek, Shasta River, California 2009-2010.
Shasta Big Springs Ranch restoration assessment	report	Assessment of restoration actions on Shasta Big Springs Ranch.	Willis et al.	Willis AD, Deas M, Jeffries C, Mount JF, Moyle PB, Nichols AL. 2011. Executive Analysis of Restoration Actions in Big Springs Creek March 2008-September 2011.
NOAA-ARRA Final report	report to NOAA	Account of restoration actions and results	Campbell, Fowler, Babcock and Hoss	
Riparian breeding bird response to cattle exclusion/passive restoration on the Shasta River, 2006-2014	peer reviewed paper #1	demonstrate that conservation actions targeting salmon have positive effects on other species of concern (riparian obligate Neotropical migrant songbirds).	Ada Fowler, Chris Babcock, Point Blue?	
Response of riparian plant community composition and density to cattle exclusion along the Shasta River, 2006-2014	peer reviewed paper #2	quantify changes in riparian plant community following removal of previously dominant grazer using a BACI (Before/After Control/Impact) study design.	Chris Babcock, Ada Fowler	
Common garden riparian planting experiment	report to USFWS	Willows were planted in 30 common gardens that were characterized by 3 different soil salinity/moisture classes and survival response was monitored	Fowler and Babcock	
Survival of riparian tree plantings by species/season/propagule	peer reviewed paper #3	Nearly 6000 willows, birch and alder trees were planted as part of a riparian restoration project on the Shasta River and their survival was followed and related to species, stock and season of planting	Fowler and Babcock	
SESR weed management plan	report	decision tree for control of invasives especially those that occur in the riparian zone and compete with native vegetation	Babcock and Obermeyer (Coda Fellow)	
LIDAR based predictive elevation model validation using survival of riparian plantings	peer reviewed paper #4	A LIDAR-based prescriptive model was tested against survival data from riparian riparian plantings on the Shasta River	Daniel Van Dyke (USFWS), Fowler	
Response to restoration: water temperature in Big Springs Creek and surrounding waterways 2009-2011	Internal TNC report for NOAA-ARRA		Ann Willis and Mike Deas	
The thermal characterization of Big Springs Creek and the Shasta River in relation to thermal tolerances of juvenile coho salmon.	peer reviewed publication	Comparisons of observed water temperature ranges and published temperature tolerances for juvenile coho salmon.	Nichols et al.	Nichols AL, Willis AD, Jeffries C, Deas ML. 2013. Water Temperature Patterns Below Large Groundwater Springs: Management Implications For Coho Salmon In The Shasta River, California. River Research and Applications.
The thermal response model of Big Springs Creek to restoration actions	peer reviewed paper #6	"Assessing cold-water management strategies in spring-fed streams using 2D water temperature models"	Ann Willis, Mike Deas, Drew Nichols, Ada Fowler, Chris Babcock	
Real-time and archived water temperature database		Multi-year database of water temperature from Shasta River, Big Springs and Little Springs	Fowler and Babcock	

Working title/topic	Deliverable, product, report, paper	Strategic purpose, associated data	Author(s); key collaborators	Full citation
Response of emergent plant cover and composition to exclusion of cattle	peer reviewed paper #7	cattle exclusion from grazing emergent vegetation in Big Springs Creek leads to increases in plant cover and important shading effects to keep waters cool	Fowler and Babcock	
Absence intermediate host polychaetes for myxozoan salmon parasite in the Shasta River	Murok Tribal Fisheries report to BoR	Surveys on the Nelson Ranch of the Shasta River demonstrate the obligate intermediate polychaete host for the myxozoan fish parasite (<i>Genotompa shasta</i>) is not present in the Shasta River and remains restricted to the main stem of the Klamath River.	Joshua Strange, Murok Tribe	http://hossor.yuroktribe.org/department/fisheries/documents/ShastaRiverPolychaeteSurvey/FINALREPORT09.pdf
Distribution and Abundance of Freshwater Mussels in the mid Klamath Subbasin, California	peer reviewed paper	included study areas on SBSR	Emily A. Davis, Anton T. David, Kari Mark Nogaard, Timothy H. Parker, Kara McKay, Christie Tennant, Toz Soto, Kate Rowe, and Ronaki Reed	http://abcd.oj.org/10.3955/046.087.0303
Soil organic fraction and watershed capacity under different grazing pressures	MS thesis	soil properties were assessed inside and outside cattle grazing enclosures to examine effects of grazing on organic matter storage and soil moisture	Cori Hutchins, Babcock, John Nishko	Hutchins, C. 2011 The role of soil organic matter in range land sustainability. MS thesis, CSU Chico
SBSR pasture productivity and biomass consumption	annual reports	Cattle grazing enclosures and biomass plot clipping provide annual estimates of pasture productivity and grazing off-take	Babcock and Fowler	
Preliminary assessment of irrigation options for the Little Springs agricultural unit	report	consideration of options to re-irrigate pastures formerly irrigated by diversions from Little Springs Creek	Devils Engineering	
SBSR ranch management plan	report to RWQCB as part of the TMDL for the Shasta River	plan outlines actions to assess irrigation water use and maintain tailwater returns to the river		
Monitoring of flows contributed to the Shasta River by the agricultural community in support of migrating Fall Chinook, September 2012	report and peer reviewed paper	Assess impact of voluntary fall releases on pool size in the lower Shasta River	Campbell, Fowler, Babcock and Willis	
Water rights management modeling summary	Internal TNC report for NOAA-ARRA		Ann Willis and Mike Deas	
Shasta Big Springs Ranch and Nelson crop flow transportation Estimates	Internal TNC report	Used to calculate consumptive use for 1707 petitions. The work defines monthly consumptive use, which equals the maximum amount of water that can be dedicated upstream	Gant Davids, Devils Engineering	
Exploration of Conveyance Loss in the Shasta River from Shasta Big Springs Ranch to Montague Grenada Road	Internal TNC report	Used to calculate consumptive use for 1707 petitions	Mike Deas, Watercourse Engineering	
Monitoring of pulse flows contributed to the Shasta River- April 2013	report and peer reviewed paper	Assess impact of spring releases flows in upper Shasta River	Campbell, Fowler, Babcock and Willis	
1707 Petition to State water board	Petition	1707 policy engagement		
Shasta Water Transaction Strategic Plan	TNC Conservation Business Plan	Water transactions Business Plan for the Shasta River	Amy Campbell, Klamath Team	
Stream Flow guidance document	Guidance document	Increase use of 1707 provision	Amy Hoss, Amy Campbell, S WIFT team	
Little Springs Baseline Assessment	report spring 2015	Gather information on LS Creek temperature, flow, geomorphology, macrophytes, invertebrates, and fish to assess habitat quality and availability	Deas, Nichols, Jeffres, Phillips, Willis	
Baseline Aquatic Ecosystem Assessment of Lower Hob in the Ground Creek: 2013-2014	report spring 2015	Lower HIG Creek information on temperature, flow, spring groundwater source, plant and insects to assess fish habitat quality and availability	Nichols and Phillips	
Big Springs Creek Channel Morphology Changes	report draft, spring 2015	fine resolution study of macrophyte/sediment seasonal dynamics 2013-2015	Nichols and Willis	
HIG assessment 2015	report	baseline ecology, water quality, and geomorph	Nichols and Phillips	
channel morphology monitoring	memo 2015	changes in BSC channel morphology over time	Nichols and Willis	
SBSR monitoring plan	plan 2015	recommended parameters and schedule for ecological monitoring	Willis et al	
Big Springs IFN report	final report 2015	Shasta River Big Springs Complex criteria stream flow needs assessment	McBain and Tush	
TBSM validation and water rights assessment	final report 2014	validation of thermal mass balance model for BSC using empirical data	Willis and Deas	
2013 water temperature analysis	report 2013	flow and water temperature monitoring on SBSR	Willis and Deas	
2014 water temperature analysis	report 2014	flow and water temperature monitoring on SBSR	Willis and Deas	
seasonal aquatic plant growth, mediantes stream temperature patterns	manuscript submitted for publication 2016	effects of seasonal macrophyte growth on temperature and flow in BSC	Willis et al	

Appendix D- Riparian Grazing Management Plan

Big Springs Ranch Wildlife Area Draft Prescribed Riparian Grazing Management Recommendation (January 11, 2016)

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Riparian Areas on the Ranch

Approximately 8 miles of the Shasta and 1.5 miles of Big Springs Creek run through The Nature Conservancy's (TNC's) Shasta Big Springs Ranch. There are three riparian reaches, two that incorporate the Shasta River, the Upper Shasta reach (which includes Little Springs reach) and the Lower Shasta reach, and one on Big Springs Creek (Figure 1). Each of these reaches are permanently fenced on both sides of the waterway with wide buffers. Riparian fencing runs along the top of a natural terrace, creating long riparian pastures on each side of the stream in each reach.

Riparian Grazing Management Recommendations

Riparian Management Goals. The ranch owner has expressed interest in developing an adaptive grazing strategy to reduce weeds within the riparian corridor – while limiting negative livestock impacts to riparian native vegetation, streambank stability, and instream habitat quality. There is good reason to expect that prescribed riparian grazing with livestock can reduce the cover and competitive advantage of invasive weeds throughout the riparian reaches – improving odds for native riparian species recruitment.

These reaches could benefit from prescribed grazing. A primary target for riparian grazing in much of the corridor should be Yellow Star Thistle (YST). Livestock impacts to other existing invasive species including; bull thistle, tall pepper weed, teasel, poison hemlock, and blackberry will primarily result from physical damage (i.e., lodging, breakage, trampling) during grazing bouts timed to target YST control. Strong research evidence demonstrates that timing (season) of grazing is key to effective YST management via livestock grazing. YST is a palatable and sought-after forage species for cattle at all growth stages prior to bolting and emergence of spiny seed heads (reproductive stage).

Cross-Fencing. Cross-fencing to create sub-grazing units within each riparian reach will increase managerial control and weed reduction outcomes while simultaneously achieving stream enhancement objectives (see above) and staying below management triggers (see below). Targeted grazing and use of portable electric fencing and livestock drinking water infrastructure increases the intensive nature of the livestock management through frequent rotation, but can

maximize weed control, while creating complete managerial control of the timing, frequency, and intensity of grazing along the streambank and other sensitive resources.

Off-stream livestock drinking water sources need to be established to provide drinking water access away from the riparian source. Portable water systems will need to be utilized, or extension of existing upland systems, to distribute drinking water to riparian pastures and sub-grazing units.

Seasons of Grazing and Livestock Management Decision Triggers. The units should not be grazed continuously throughout the season– there should be appropriate periods of rest during the growing season which will enhance productivity and persistence of desired riparian species. If sub-grazing units are established, then a grazing rotation should be implemented to maximize weed control and resource protection from inadvertent livestock impacts. Management decision triggers described below will ensure grazing intensity and livestock impacts to the stream channel are in balance with short and long-term goals listed above. For complete protection of streambanks and in-stream habitat – electric fencing will be established along the stream green line.

Managers must have real-time indicators they can observe directly on the ground to make decisions about the readiness of riparian grazing units for grazing (e.g., sufficient forage for grazing), and when livestock need to be moved from a riparian unit to achieve conservation goals (e.g., excessive browse on recruiting riparian woody plants <5ft in height, excessive streambank disturbance). For this site we recommend during any grazing bout that 1) physical hoof damage to streambanks be limited to no more than 20% of streambank per each side of stream; 2) minimum stubble height of browsed herbaceous vegetation at the stream green line not go below 3”; and that 3) browse on recruiting riparian woody plants (< 5ft in height – below cattle maximum browse height) be limited to no more that 20% of current year’s leader growth within the riparian unit. Once any of these three triggers are hit during a grazing bout, livestock should immediately be rotated out of that riparian unit or sub unit.

Table 1. Management triggers

Indicator	Trigger
Browse use on recruiting riparian woody species < 5 ft. in height	20% of current years leader growth
Streambank Hoof action	20% of each side of a streambank

Recommended Grazing Monitoring and Documentation. Siskiyou County UCCE and UC Davis will collaborate annually to provide hands-on, in-the-field training on assessing real-time status of the livestock management decision triggers recommended in the section above. We will

base this training on standard, national methods developed in the “Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation”

(<http://www.blm.gov/nstc/library/pdf/MIM.pdf>). We recommend progress towards these management triggers be assessed every 2 days during all riparian grazing bouts where livestock have direct access to the stream channel. We recommend, and will provide training on, the establishment of permanent photo monitoring points in the riparian grazing unit. Photos should be taken at the beginning and end of each grazing bout (certainly within the first few years of grazing). Photo points should be established so that riparian woody species, herbaceous stubble height at the stream green line, and streambank conditions can be clearly observed and thus conditions and outcomes documented. Finally, we recommend that dates on and off, and numbers of livestock by species and class used during each grazing bout be recorded for each riparian grazing unit.

