INTRODUCTION

A stream inventory was conducted July 20 to July 26, 2017 on Dinner Creek. The survey began at the confluence with China Creek and extended upstream 2.1 miles.

The Dinner Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Dinner Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook and coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's North Coast streams. This report was finalized in March, 2018.

WATERSHED OVERVIEW

Dinner Creek, located in southern Humboldt County, is a tributary to China Creek, which is a tributary to Redwood Creek, which is a tributary to South Fork Eel River, a tributary to the Eel River which drains to Pacific Ocean in northern California (Map 1). Dinner Creek's legal description at the confluence with China Creek is T04S R02E S23. Its location is 40.0618° north latitude and -123.5534° west longitude, LLID number 1239262401049. Dinner Creek is a first order stream and has approximately 1.5 miles of blue line stream according to the USGS Briceland 7.5 minute quadrangle. Dinner Creek drains a watershed of approximately 1.5 square miles. Elevations range from about 660 feet at the mouth of the creek to 1,200 feet in the headwater areas. Grasslands and oak and Douglas fir forest dominate the watershed. The watershed is privately owned and managed as residential. Vehicle access exists from State Highway 101 to Briceland via Redwood Drive, Redway. The mouth of Dinner Creek is located approximately 65 feet from Briceland Road, three miles from the town of Briceland.

METHODS

The habitat inventory conducted in Dinner Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al, 1998). The Watershed Stewards Project (WSP) members and California Department of Fish and Wildlife (CDFW) personnel that conducted the inventory were trained in standardized habitat inventory methods by CDFW. This inventory was conducted by a two-person team.
SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement. Surveyors also take photos to document general habitat conditions, significant features (landslides, potential barriers, etc.), and end of survey (Appendix II).

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Dinner Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:
Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:
Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:
Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:
Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Dinner Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.
5. Embeddedness:
The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobbles that is surrounded or buried by fine sediment. In Dinner Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuitable for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:
Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Dinner Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. The shelter rating is then calculated by multiplying the qualitative shelter value by the percent of the unit covered. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:
Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:
Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Dinner Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood trees.

9. Bank Composition and Vegetation:
Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Dinner Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.
10. Large Woody Debris Count:
Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:
Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

**BIOLOGICAL INVENTORY**

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Dinner Creek. In addition, underwater mask and snorkel observations were made at 11 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

**DATA ANALYSIS**

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Dinner Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
The habitat inventory of July 20 to July 26, 2017 was conducted by Kori Roberts (CDFW) and Chris Tevini (CCC). The total length of the stream surveyed was 10,876 feet.

Stream flow was not measured.

Dinner Creek is a B2 channel type for 1,353 feet of the stream surveyed (Reach 1), and an F4 channel type for 9,523 feet of the stream surveyed (Reach 2).

Water temperatures taken during the survey period ranged from 52° to 62° Fahrenheit. Air temperatures ranged from 60° to 74° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 40% riffle units, 36% pool units, 22% flatwater units, and 1% culvert units (Graph 1). Based on total length of Level II habitat types there were 42% pool units, 29% riffle units, 23% flatwater units, 4% dry units, and 2% culvert units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units (39%), mid-channel pool units (36%), and run units (22%) (Graph 3). Based on percent total length, mid-channel pool units (42%), low gradient riffle units (25%), and run units (23%).

A total of 128 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (Graph 4), and comprised 100% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-one of the 128 pools (24%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 129 pool tail-outs measured, 124 had a value of 1 (96.1%), 4 had a value of 2 (3.1%), and 1 had a value of 4 (0.8%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.
A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 0, flatwater habitat types had a mean shelter rating of 4, and pool habitats had a mean shelter rating of 14 (Table 1). Only main-channel pools were observed (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation is the dominant cover type in Dinner Creek. Graph 7 describes the pool cover in Dinner Creek. Terrestrial vegetation is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 88% of the pool tail-outs. Sand was the next most frequently observed dominant substrate type and occurred in 5% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Dinner Creek was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 88% and 12%, respectively. Graph 9 describes the mean percent canopy in Dinner Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 52% sand/silt/clay, 42% cobble/gravel, 4% boulder, 2% bedrock (Graph 10). Hardwood trees were the dominant vegetation type observed in 93.7% of the units surveyed. Additionally, 6% of the units surveyed had coniferous as the dominant vegetation type, and 0.3% had no vegetation (Graph 11).

**BIOLOGICAL INVENTORY RESULTS**

Survey teams conducted a mask and snorkel survey at 10 sites for species composition and distribution in Dinner Creek on July 27, 2017 (Table A). The sites were sampled by Kori Roberts, Ryan Bernstein (CDFW), and Chris Tevini (CCC).

In Reach 1 which comprised the first 1,353 feet of stream, three sites were sampled. The reach sites yielded 8 young-of-the-year (YOY) steelhead trout (SH), and one YOY coho salmon.

In Reach 2, 8 sites were sampled starting approximately 1,452 from the confluence with Indian Creek and continuing upstream 10,252 feet. The reach sites yielded 58 young-of-the-year SH, and 49 YOY coho salmon.

During the survey, the upstream-most observation of juvenile coho and steelhead trout occurred at 40.09072° north latitude and -123.93671° west longitude, approximately 10,241 feet upstream from the confluence with China Creek.
Table A. Summary of results for a fish composition and distribution survey within Dinner Creek, July 24 & August 24, 2017.

<table>
<thead>
<tr>
<th>Date</th>
<th>Survey Site #</th>
<th>Habitat Unit #</th>
<th>Habitat Type</th>
<th>Approx. Dist. from mouth (ft.)</th>
<th>Steelhead Trout</th>
<th>Coho Salmon</th>
<th>Additional Aquatic Species Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date</td>
<td></td>
<td></td>
<td></td>
<td>YOY 1+  2+</td>
<td>YOY 1+</td>
<td></td>
</tr>
<tr>
<td>Reach 1: B2 Channel Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07/24/17</td>
<td>1</td>
<td>15</td>
<td>Pool</td>
<td>786</td>
<td>0    0     0</td>
<td>0    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>17</td>
<td>Pool</td>
<td>848</td>
<td>4    0     0</td>
<td>0    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>19</td>
<td>Pool</td>
<td>900</td>
<td>4    0     0</td>
<td>1    0</td>
<td></td>
</tr>
<tr>
<td>Reach 2: F4 Channel Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07/24/17</td>
<td>4</td>
<td>32</td>
<td>Pool</td>
<td>1,452</td>
<td>1    0     0</td>
<td>1    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>33</td>
<td>Pool</td>
<td>1,480</td>
<td>18   0     0</td>
<td>0    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>35</td>
<td>Pool</td>
<td>1,543</td>
<td>12   0     0</td>
<td>0    0</td>
<td></td>
</tr>
<tr>
<td>08/24/17</td>
<td>7</td>
<td>190</td>
<td>Pool</td>
<td>6,363</td>
<td>1    0     0</td>
<td>30   0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>201</td>
<td>Pool</td>
<td>6,388</td>
<td>7    0     0</td>
<td>9    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>203</td>
<td>Pool</td>
<td>6,608</td>
<td>3    1     0</td>
<td>8    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>205</td>
<td>Pool</td>
<td>6,665</td>
<td>13   0     0</td>
<td>0    0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>344</td>
<td>Pool</td>
<td>10,241</td>
<td>3    0     0</td>
<td>1    0</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

Dinner Creek is a B2 channel type for the first 1,353 feet of stream surveyed and an F4 channel type for the next 9,523 feet. The suitability of B2 and F4 channel types for fish habitat improvement structures is as follows: B2 channel types excellent for plunge weirs, single and opposing wing-deflectors, and log cover. F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days July 20 to July 26, 2017 ranged from 52°F to 62°F Fahrenheit. Air temperatures ranged from 60°F to 74°F Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 23% of the total length of this survey, riffles 29%, and pools 42%. Thirty-one of the 128 (24%) pools had a maximum residual depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width.

One hundred twenty-eight of the 129 pool tail-outs measured had embeddedness ratings of 1 or 2. One of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be...
25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

One hundred-seventeen of the 128 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools is 14. The shelter rating in the flatwater habitats is 4. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by terrestrial vegetation in Dinner Creek. Terrestrial vegetation is the dominant cover type in pools followed by small woody debris. Log and rootwad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 97%. Reach 1 had a canopy density of 97.25% and Reach 2 had a canopy density of 96.84%. The percentage of right and left bank covered with vegetation was 97% and 99%, respectively.

RECOMMENDATIONS

Dinner Creek should be managed as an anadromous, natural production stream. Recommendations for potential habitat improvement activities are based on target habitat values suitable for salmonids in California’s north coast streams. Considering the results from this stream habitat inventory, factors that affect salmonid productivity and CDFW’s professional judgment, the following list prioritizes habitat improvement activities in Dinner Creek. Keep in mind, watershed and stream ecosystem processes, land use alterations, changes in land ownership, and other factors could potentially change the order of these recommendations or create the need to remove/add recommendations in the future.

1) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from Terrestrial Vegetation. Adding high quality complexity with woody cover in the pools is desirable.

2) Based on observed stream flow conditions pools may become disconnected. Since 2015, the Salmonid Restoration Federation has had grant funding to conduct a low flow stream discharge study in Redwood Creek, including a site in Dinner Creek. Streamflow should continue be monitored to determine if it is limiting for salmonids and augment low flows to optimize benefits to juvenile salmonids.

3) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

4) Where feasible, design and engineer pool enhancement structures to increase the number of pools or enhance the numerous, current shallow pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
While the overall canopy density is near 100% on Dinner Creek, it is largely composed (88%) of hardwood trees. In order to provide more structure to the canopy, reduce water temperatures, and increase LWD recruitment consider planting appropriate native coniferous species like redwood and Douglas fir along the stream. Also where site conditions are appropriate consider cautious thinning of hardwoods to hasten the development of denser and more extensive coniferous canopy component. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

<table>
<thead>
<tr>
<th>Position (ft):</th>
<th>Habitat unit #:</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0001.00</td>
<td>Start of survey at the confluence of China Creek. Channel type is a B2. Channel type cross-section location is at Habitat unit (HU) #25.</td>
</tr>
<tr>
<td>254</td>
<td>0011.00</td>
<td>Culvert #1 is the passage under Briceland Thorn Road, and 7.4’ high x 7.4’ wide x 37’ long. It is composed of 1 culvert, and is made of concrete. The culvert's diameter is 7.4’, its plunge height is 2.6’, and it has a maximum depth of 0.2’ within 5’ of the outlet. The slope is 2%, and its condition is good. It is not a possible barrier to juvenile and adult salmonids.</td>
</tr>
<tr>
<td>1353</td>
<td>0033.00</td>
<td>Channel type changes to a F4 at HU #33. Channel type cross-section location is at HU #33.</td>
</tr>
<tr>
<td>1670</td>
<td>0044.00</td>
<td>Log Debris Accumulation (LDA) #1 is 5’ high x 42’ wide x 4.5’ long and contains 1 pieces of Large Woody Debris (LWD). Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.</td>
</tr>
<tr>
<td>2840</td>
<td>0079.00</td>
<td>LDA #2 is 4’ high, 21’ wide, 5.5’ long and contains 2 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a barrier to salmonids. Fish were observed above the LDA.</td>
</tr>
<tr>
<td>3040</td>
<td>0085.00</td>
<td>Briceland Road runs along the left bank.</td>
</tr>
<tr>
<td>3239</td>
<td>0090.00</td>
<td>Culvert #2 is the passage under an unnamed road, and is 6.4’ high x 6.6’ wide x 21’ long. It is composed of 1 culvert, and is made of metal. The culvert's diameter is 6.6’, its plunge height is 0, and it has a maximum</td>
</tr>
</tbody>
</table>
depth of 2' within 5' of the outlet. The slope is 0%, and its condition is good. It is not a possible barrier to juvenile and adult salmonids.

LDA #3 is 4' high x 22' wide x 7.5' long and contains 4 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.

LDA #4 is 3.5' high x 17' wide x 10.5' long and contains 4 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.

There is a Salmon Restoration Project (SRP) made of LWD at the upstream end of the pool.

The pools in Habitat Unit (HU) #185 and 186 are separated by a cement SRP.

Culvert #3 is the passage under Briceland Road, and is 6.2' high x 6.4' wide x 95' long. It is composed of 1 culvert, and is made of metal. The culvert's diameter is 6.4', its plunge height is 2.4', and it has a maximum depth of 0.3' within 5' of the outlet. The slope is 0%, and its condition is poor. The bottom is rusted out. It is not a possible barrier to adult salmonids, but is a possible barrier to juvenile salmonids.

Briceland Road runs along the left bank.

Tributary #1 enters on the right bank. The water temperature of the tributary was 62 Fahrenheit, the water temperature downstream of the confluence was 62°F Fahrenheit, and the water temperature upstream of the confluence was 62°F Fahrenheit. The slope of the tributary is approximately 2%. The tributary is accessible to salmonids. Fish were observed in the tributary.

There is a LWD SRP at the upstream end of the pool.

A dry tributary enter on the right bank.

There is a LWD SRP at the Upstream end of the pool.

The channel is very entrenched.

There is erosion on the left bank.
A dry tributary enters on the left bank.

There is erosion on the right bank.

Tributary #4 enters on the left bank. It contributes to approximately 50% of Dinner Creek's flow. The water temperature of the tributary was 60° Fahrenheit, the water temperature downstream of the confluence was 60° Fahrenheit, and the water temperature upstream of the confluence was 60° Fahrenheit. The slope of the tributary is 50%. The tributary is accessible to salmonids. Fish were observed in the tributary.

HU# 331 and 332 are separated by a LWD SRP spanning the channel.

A dry tributary enters from the right bank.

Tributary # enters on the right bank. It contributes to approximately 80% of Dinner Creek's flow. The water temperature of the tributary was 58° Fahrenheit, the water temperature downstream of the confluence was 60° Fahrenheit, and the water temperature upstream of the confluence was 65° Fahrenheit. The slope of the tributary is 2-4%. The tributary is accessible to salmonids. Fish were not observed in the tributary.

Culvert #6 is the passage under Briceland Road, and is 7.8' high x 9.7' wide x 71' long. It is composed of 1 culvert, and is made of metal. The culvert's diameter is 9.7'. The slope is 1%, and its condition is good. It is not a possible barrier to juvenile and adult salmonids. The creek ran dry at the downstream end of the culvert.

End of survey due to 400 feet of dry channel.

REFERENCES


REPORT CONTACT INFORMATION

California Department of Fish and Wildlife
Coastal Watershed Planning and Assessment Program
1487 Sandy Prairie ct., Suite A
Fortuna, CA 95540
www.coastalwatersheds.ca.gov
**LEVEL III and LEVEL IV HABITAT TYPES**

**RIFFLE**
- Low Gradient Riffle (LGR) [1.1] 1
- High Gradient Riffle (HGR) [1.2] 2

**CASCADE**
- Cascade (CAS) [2.1] 3
- Bedrock Sheet (BRS) [2.2] 24

**FLATWATER**
- Pocket Water (POW) [3.1] 21
- Glide (GLD) [3.2] 14
- Run (RUN) [3.3] 15
- Step Run (SRN) [3.4] 16
- Edgewater (EDW) [3.5] 18

**MAIN CHANNEL POOLS**
- Trench Pool (TRP) [4.1] 8
- Mid-Channel Pool (MCP) [4.2] 17
- Channel Confluence Pool (CCP) [4.3] 19
- Step Pool (STP) [4.4] 23

**SCOUR POOLS**
- Corner Pool (CRP) [5.1] 22
- Lateral Scour Pool - Log Enhanced (LSL) [5.2] 10
- Lateral Scour Pool - Rootwad Enhanced (LSR) [5.3] 11
- Lateral Scour Pool - Bedrock Formed (LSBk) [5.4] 12
- Lateral Scour Pool - Boulder Formed (LSBo) [5.5] 20
- Plunge Pool (PLP) [5.6] 9

**BACKWATER POOLS**
- Secondary Channel Pool (SCP) [6.1] 4
- Backwater Pool - Boulder Formed (BPB) [6.2] 5
- Backwater Pool - Rootwad Formed (BPR) [6.3] 6
- Backwater Pool - Log Formed (BPL) [6.4] 7
- Dammed Pool (DPL) [6.5] 13

**ADDITIONAL UNIT DESIGNATIONS**
- Dry (DRY) [7.0]
- Culvert (CUL) [8.0]
- Not Surveyed (NS) [9.0]
- Not Surveyed due to a marsh (MAR) [9.1]
Map 1
Dinner Creek
South Fork Eel River Watershed
Briceland Quad, Humboldt County

Start of Survey

End of Survey
*River Mile 2.02

*River Mile 1.9

Reach 1: B2 Channel Type
Reach 2: F4 Channel Type
Dinner Creek

Last observed juvenile coho & steelhead trout

Coordinate System: NAD 1983 California Teale Albers
Data Sources: CDFW, USGS, CalWater 2.21, CDF 24k

*River Mile indicates distance from confluence with China Creek

Reach 1: B2 Channel Type
Reach 2: F4 Channel Type
Dinner Creek

Data Sources: CDFW, USGS, CalWater 2.21, CDF 24k

*River Mile indicates distance from confluence with China Creek
APPENDIX I

TABLES AND GRAPHS
Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Dinner Creek
Survey Dates: 7/20/2017 to 7/26/2017
Confluence Location: Quad: BRICELAND
Legal Description: T04SR02ES23
Latitude: 40:06:18.0N
Longitude: 123:55:34.0

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Units</th>
<th>Fully Measured</th>
<th>Habitat Type</th>
<th>Habitat Occurrence (%)</th>
<th>Mean Length (ft.)</th>
<th>Total Length (ft.)</th>
<th>Mean Width (ft.)</th>
<th>Mean Depth (ft.)</th>
<th>Mean Max Depth (ft.)</th>
<th>Mean Area (sq.ft.)</th>
<th>Estimated Total Area (sq.ft.)</th>
<th>Mean Volume (cu.ft.)</th>
<th>Estimated Total Volume (cu.ft.)</th>
<th>Mean Residual Pool Vol (cu.ft.)</th>
<th>Mean Shelter Rating</th>
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<td>252</td>
<td>14</td>
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<tr>
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<td>22</td>
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Total Units Fully Measured
<table>
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<th>Total Length (ft.)</th>
<th>Total Area (sq.ft.)</th>
<th>Total Volume (cu.ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>357</td>
<td>10876</td>
<td>75138</td>
<td>55593</td>
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Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Dinner Creek
Survey Dates: 7/20/2017 to 7/26/2017
Confluence Location: LLID: 1239262401049
Quad: BRICELAND
Legal Description: T04SR02ES23
Latitude: 40:06:18.0N
Longitude: 123:55:34.0W
Drainage: Eel River - South Fork

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<thead>
<tr>
<th>Habitat Units</th>
<th>Fully Measured</th>
<th>Habitat Type</th>
<th>Habitat Occurrence (%)</th>
<th>Mean Length (ft.)</th>
<th>Total Length (ft.)</th>
<th>Total Length (%)</th>
<th>Mean Width (ft.)</th>
<th>Mean Depth (ft.)</th>
<th>Max Depth (ft.)</th>
<th>Mean Area (sq.ft.)</th>
<th>Estimated Total Area (sq.ft.)</th>
<th>Mean Volume (cu.ft.)</th>
<th>Estimated Total Volume (cu.ft.)</th>
<th>Mean Residual Pool Vol (cu.ft.)</th>
<th>Mean Shelter Rating</th>
<th>Mean Canopy (%)</th>
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Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
---------------------------|---------------------|---------------------|-----------------------|
357                        | 151                 | 10876               | 74711                 | 55477               |
### Table 3 - Summary of Pool Types

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<tr>
<th>Habitat Units</th>
<th>Units Fully Measured</th>
<th>Habitat Type</th>
<th>Habitat Occurrence (%)</th>
<th>Mean Length (ft.)</th>
<th>Total Length (ft.)</th>
<th>Total Length (%)</th>
<th>Mean Width (ft.)</th>
<th>Mean Residual Depth (ft.)</th>
<th>Mean Area (sq.ft.)</th>
<th>Estimated Total Area (sq.ft.)</th>
<th>Mean Residual Pool Vol (cu.ft.)</th>
<th>Estimated Total Resid.Vol. (cu.ft.)</th>
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<th>Total Area (sq.ft.)</th>
<th>Total Volume (cu.ft.)</th>
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<td>128</td>
<td>4574</td>
<td>40156</td>
<td>32251</td>
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Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

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<th>Total &lt; 1 Foot Max Resid. Depth</th>
<th>Total 1&lt; 2 Foot Max Resid. Depth</th>
<th>Total 1&lt; 2 Foot Max Resid. Depth</th>
<th>Total 2&lt; 3 Foot Max Resid. Depth</th>
<th>Total 2&lt; 3 Foot Max Resid. Depth</th>
<th>Total 3&lt; 4 Foot Max Resid. Depth</th>
<th>Total 3&lt; 4 Foot Max Resid. Depth</th>
<th>Total &gt;= 4 Foot Max Resid. Depth</th>
<th>Total &gt;= 4 Foot Max Resid. Depth</th>
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<td>17</td>
<td>5</td>
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<td>4</td>
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Mean Maximum Residual Pool Depth (ft.): 1.7
Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Dinner Creek    LLID: 1239262401049    Drainage: Eel River-South Fork
Survey Dates: 7/20/2017 to 7/26/2017    Dry Units: 1

Confluence Location: Quad: Briceland    Legal Description: T04SR02ES23    Latitude: 40:06:18.0N    Longitude: 123:55:34.0W

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<thead>
<tr>
<th>Habitat</th>
<th>Units Fully Measured</th>
<th>Habitat Type</th>
<th>Mean % Undercut Banks</th>
<th>Mean % SWD</th>
<th>Mean % LWD</th>
<th>Mean % Root Mass</th>
<th>Mean % Terr. Vegetation</th>
<th>Mean % Aquatic Vegetation</th>
<th>Mean % White Water</th>
<th>Mean % Boulders</th>
<th>Mean % Bedrock Ledges</th>
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<tbody>
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<td>0</td>
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<td>0</td>
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<tr>
<td>128</td>
<td>127</td>
<td>MCP</td>
<td>12</td>
<td>27</td>
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<td>4</td>
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<td>0</td>
<td>11</td>
<td>0</td>
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<tr>
<td>128</td>
<td>127</td>
<td>TOTAL POOL</td>
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<td>27</td>
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### Table 6 - Summary of Dominant Substrates By Habitat Type

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<th>Stream Name:</th>
<th>Dinner Creek</th>
<th>LLID: 1239262401049</th>
<th>Drainage: Eel River - South Fork</th>
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<tr>
<td>Survey Dates:</td>
<td>7/20/2017 to 7/26/2017</td>
<td>Dry Units: 1</td>
<td>Confluence Location:</td>
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<td>Quad:</td>
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<td>Legal Description: T04SR02ES23</td>
<td>Latitude: 40:06:18.0N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitat Units</th>
<th>Units Fully Measured</th>
<th>Habitat Type</th>
<th>% Total Silt/Clay Dominant</th>
<th>% Total Sand Dominant</th>
<th>% Total Gravel Dominant</th>
<th>% Total Small Cobble Dominant</th>
<th>% Total Large Cobble Dominant</th>
<th>% Total Boulder Dominant</th>
<th>% Total Bedrock Dominant</th>
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<tbody>
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<td>140</td>
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<td>1</td>
<td>4</td>
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### Table 7 - Summary of Mean Percent Canopy for Entire Stream

<table>
<thead>
<tr>
<th>Mean Percent Canopy</th>
<th>Mean Percent Conifer</th>
<th>Mean Percent Hardwood</th>
<th>Mean Percent Open Units</th>
<th>Mean Right Bank % Cover</th>
<th>Mean Left Bank % Cover</th>
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</thead>
<tbody>
<tr>
<td>97</td>
<td>12</td>
<td>88</td>
<td>0</td>
<td>97</td>
<td>99</td>
</tr>
</tbody>
</table>

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.
Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Dinner Creek  
Survey Dates: 7/20/2017 to 7/26/2017  
Confluence Location: BRI/CELAND  
LLID: 1239262401049  
Drainage: Eel River - South Fork

Survey Length (ft.): 10876  
Main Channel (ft.): 10876  
Side Channel (ft.): 0  
Legal Description: T04SR02ES23  
Latitude: 40:06:18.0N  
Longitude: 123:55:34.0W

Summary of Fish Habitat Elements By Stream Reach

| STREAM REACH: 1 | Channel Type: B2 | Canopy Density (%): 97.3 | Pools by Stream Length (%): 20.2 |
| Reach Length (ft.): 1353 | Coniferous Component (%): 5.0 | Pool Frequency (%): 31.3 |
| Rifflle/Flatwater Mean Width (ft.): 6.8 | Hardwood Component (%): 95.0 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Hardwood Trees | < 2 Feet Deep: 70 |
| Range (ft.): 16 to 46 | Vegetative Cover (%): 95.8 | 2 to 2.9 Feet Deep: 10 |
| Mean (ft.): 22 | Dominant Shelter: Boulders | 3 to 3.9 Feet Deep: 10 |
| Std. Dev.: 7 | Dominant Bank Substrate Type: Boulder | >= 4 Feet Deep: 10 |
| Base Flow (cfs.): 0.0 | Occurrence of LWD (%): 1 |
| Water (F): 56 - 56 Air (F): 62 - 70 | LWD per 100 ft.: |
| Dry Channel (ft.): 0 | Mean Pool Shelter Rating: 11 |
| Pool Tail Substrate (%): Silt/Clay: 0 | Sand: 0 |
| Embeddedness Values (%): 1. 90.0 2. 0.0 3. 0.0 4. 10.0 5. 0.0 |

| STREAM REACH: 2 | Channel Type: F4 | Canopy Density (%): 96.8 | Pools by Stream Length (%): 45.2 |
| Reach Length (ft.): 9523 | Coniferous Component (%): 12.8 | Pool Frequency (%): 36.3 |
| Rifflle/Flatwater Mean Width (ft.): 5.8 | Hardwood Component (%): 87.2 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Hardwood Trees | < 2 Feet Deep: 76 |
| Range (ft.): 10 to 46 | Vegetative Cover (%): 98.3 | 2 to 2.9 Feet Deep: 18 |
| Mean (ft.): 16 | Dominant Shelter: Terrestrial Veg. | 3 to 3.9 Feet Deep: 3 |
| Std. Dev.: 5 | Dominant Bank Substrate Type: Sand/Silt/Clay | >= 4 Feet Deep: 3 |
| Base Flow (cfs.): 0.0 | Occurrence of LWD (%): 11 |
| Water (F): 52 - 62 Air (F): 60 - 74 | LWD per 100 ft.: |
| Dry Channel (ft.): 400 | Mean Pool Shelter Rating: 14 |
| Pool Tail Substrate (%): Silt/Clay: 0 | Sand: 5 |
| Embeddedness Values (%): 1. 96.6 2. 3.4 3. 0.0 4. 0.0 5. 0.0 |
### Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Dinner Creek  
Survey Dates: 7/20/2017 to 7/26/2017  
Confluence Location: Quad BRICELAND  
Legal Description: T04SR02ES23  
Latitude: 40:06:18.0N  
Longitude: 123:55:34.0W  
LLID: 1239262401049  
Drainage: Eel River - South Fork

#### Mean Percentage of Dominant Stream Bank Substrate

<table>
<thead>
<tr>
<th>Dominant Class of Substrate</th>
<th>Right Bank</th>
<th>Left Bank</th>
<th>Total Mean Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrock</td>
<td>3</td>
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<td>1.7</td>
</tr>
<tr>
<td>Boulder</td>
<td>6</td>
<td>7</td>
<td>4.3</td>
</tr>
<tr>
<td>Cobble / Gravel</td>
<td>59</td>
<td>68</td>
<td>42.3</td>
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<tr>
<td>Sand / Silt / Clay</td>
<td>82</td>
<td>73</td>
<td>51.7</td>
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</table>

#### Mean Percentage of Dominant Stream Bank Vegetation

<table>
<thead>
<tr>
<th>Dominant Class of Vegetation</th>
<th>Right Bank</th>
<th>Left Bank</th>
<th>Total Mean Percent (%)</th>
</tr>
</thead>
<tbody>
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<td>0.0</td>
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<tr>
<td>Brush</td>
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<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Total Stream Cobble Embeddedness Values:** 1
Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Dinner Creek  LLID: 123926401049  Drainage: Eel River-South Fork
Survey Dates: 7/20/2017 to 7/26/2017
Confluence Location: Quad: BRICELAND  Legal Description: T04SR02ES23  Latitude: 40:06:18.0N  Longitude: 123:55:34.0W

<table>
<thead>
<tr>
<th></th>
<th>Riffles</th>
<th>Flatwater</th>
<th>Pools</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDERCUT BANKS (%)</td>
<td>0</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>SMALL WOODY DEBRIS (%)</td>
<td>0</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td>LARGE WOODY DEBRIS (%)</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>ROOT MASS (%)</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>TERRESTRIAL VEGETATION (%)</td>
<td>0</td>
<td>53</td>
<td>32</td>
</tr>
<tr>
<td>AQUATIC VEGETATION (%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>WHITETWATER (%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BOULDERS (%)</td>
<td>100</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>BEDROCK LEDGES (%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
DINNER CREEK 2017
HABITAT TYPES BY PERCENT OCCURRENCE

- POOL: 35.9%
- FLATWATER: 22.4%
- RIFFLE: 40.3%
- CULVERT: 1.1%
- DRY: 0.3%
DINNER CREEK 2017
HABITAT TYPES BY PERCENT TOTAL LENGTH

POOL 42.1%
RIFFLE 29.5%
FLATWATER 22.7%
DRY 3.7%
CULVERT 2.1%
DINNER CREEK  2017
HABITAT TYPES BY PERCENT OCCURRENCE

PERCENT OCCURRENCE

HABITAT TYPE

GRAPH 3
DINNER CREEK  2017
POOL TYPES BY PERCENT OCCURRENCE

MAIN
100.0%
DINNER CREEK  2017
MAXIMUM DEPTH IN POOLS

MAXIMUM RESIDUAL DEPTH

# OF POOLS

<1 FOOT  1-<2 FEET  2-<3 FEET  3-<4 FEET  >=4 FEET

GRAPH 5
DINNER CREEK 2017
MEAN PERCENT COVER TYPES IN POOLS

- BEDROCK LEDGES: 0.5
- BOULDERS: 10.6
- UNDERCUT BANKS: 12.0
- SMALL WOODY DEBRIS: 27.8
- LARGE WOODY DEBRIS: 13.7
- ROOT MASS: 3.1
- TERRESTRIAL VEG: 32.2
DINNER CREEK  2017
MEAN PERCENT CANOPY

CONIFEROUS TREES
11.8%

HARDWOOD TREES
85.0%

OPEN
3.1%
DINNER CREEK  2017
DOMINANT BANK COMPOSITION IN SURVEY REACH

BEDROCK 1.7%  BOULDER 4.3%
SAND/SILT/CLAY 51.7%
COBBLE/GRAVEL 42.3%

GRAPH 10
DINNER CREEK 2017
DOMINANT BANK VEGETATION IN SURVEY REACH

- HARDWOOD TREES: 93.7%
- CONIFEROUS TREES: 6.0%
- NO VEGETATION: 0.3%

GRAPH 11
Photo 1: Culvert #3 at habitat unit #188, 6,201’ upstream from start of survey. Pools (habitat units #185 & 186) separated by a cement Salmon Recovery Plan structure. (Photo taken 7/26/17)

Photo 2: Tributary #4 at habitat unit #306, 9,250’ upstream from start of survey. (Photo taken 7/26/17)
Photo 3: End of survey due to dry channel at habitat unit #355, 10,648’ upstream from start of survey.
(Photo taken 7/26/17)