California Department of Fish and Game
Petaluma River Watershed
Stream Habitat Assessment Reports

Lynch Creek

Surveyed 2007

STREAM INVENTORY REPORT

Lynch Creek

Surveyed Summer 2007
Report Completed March 2008

INTRODUCTION

A stream inventory was conducted during 6/21/2007 to 7/31/2007 on Lynch Creek. The survey began at the confluence with the Petaluma River and extended upstream 7.4 miles. Stream inventories subsections to this report were also completed for two tributaries to Lynch Creek. The Lynch 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 Lynch 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 salmon and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Lynch Creek is a tributary to the Petaluma River, which runs into San Pablo Bay, and is located in Sonoma County, California (Map 1). Lynch Creek's legal description at the confluence with the Petaluma River is T005 R007 S28. Its location is 38°14'51.0" north latitude and 122°38'12.0" west longitude, LLID number 1226366382476. Lynch Creek is a first order stream and has approximately 7.07 miles of blue line stream according to the USGS National Hydrography Dataset (NHD). Lynch Creek drains a watershed of approximately 3.93 square miles. Elevations range from about 16 feet at the mouth of the creek to 2320 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is primarily privately owned (98.8%). The remaining portion (1.2%) is owned by the local government. The watershed land use is primarily considered natural at 54.4% and agriculture at 41.6%. It is also 3.9% Urban. Vehicle access exists via Adobe and Sonoma Mountain Roads east of Petaluma.

METHODS

The habitat inventory conducted in Adobe Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game (DFG) personnel and Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game. 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.

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 Lynch 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 clinometer, 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". Lynch 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 cobble that is surrounded or buried by fine sediment. In Lynch 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 unsuited 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. 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 Lynch 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. 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 Lynch 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 Lynch 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 Lynch Creek. In addition, two sites were electrofished 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 Game. 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 Lynch Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of 6/21/2007 to 7/31/2007 was conducted by J. Hanson (WSP) and H. Fett (DFG). The total length of the stream surveyed was 38,983 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.09 cfs on 6/21/2007.

Lynch Creek is an F6 channel type for 2,743 feet of the stream surveyed (Reach 1), an F4 channel type for 3,695 feet of the stream surveyed (Reach 2), an F3 channel type for 11,919 feet of the stream surveyed (Reach 3), an NA channel type for 14,006 feet of the stream surveyed (Reach 4), a B3 channel type for 1,379 feet of the stream surveyed (Reach 5), and an A3 channel type for 5,241 feet of the stream surveyed (Reach 6).

F6, F4 and F3 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios, and have silt, gravel and cobble dominant substrates, respectively. B3 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and cobble dominant substrates. A3 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and cobble dominant substrates.

Water temperatures taken during the survey period ranged from 57 to 64 degrees Fahrenheit. Air temperatures ranged from 56 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 1% no survey-marsh units, 9% culvert units, 33% flatwater units, 16% pool units, 23% riffle units, 17% dry units, and 1% nosurvey units (Graph 1). Based on total length of Level II habitat types there were 3% no survey-marsh units, 2% culvert units, 16% flatwater units, 1% pool units, 4% riffle units, 38% dry units, and 36% nosurvey units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by

percent occurrence were 20% Glide units, 22% Low Gradient Riffle units, 17% Dry units, (Graph 3). Based on percent total length, 38% were Dry units, 36% Not Surveyed units, and 10% Step Run units.

A total of 24 pools were identified (Table 3). Scour pools were the most frequently encountered, at 75%, and comprised 81% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Nine of the 24 pools (38%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 24 pool tail-outs measured and shown in Graph 6, 7 had a value of 1 (29.2%); 8 had a value of 2 (33.3%); 1 had a value of 3 (4.2%); 1 had a value of 4 (4.2%); and 7 had a value of 5 (29.2%). 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 unsuited 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 8, and pool habitats had a mean shelter rating of 18 (Table 1). Of the pool types, the Scour pools had a mean shelter rating of 16, while the Main Channel pools had a mean shelter rating of 22 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Lynch Creek. Graph 7 describes the pool cover in Lynch Creek. Boulders are the dominant pool cover type followed by undercut banks.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. A gravel substrate type was observed in 33% of pool tail-outs while small cobble was observed in 29% of pool tail-outs.

The mean percent canopy density for the surveyed length of Lynch Creek was 77%. The mean percentages of hardwood and coniferous trees were 100% and 0%, respectively. Twenty-three percent of the canopy was open. Graph 9 describes the mean percent canopy in Lynch Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 52%. The mean percent left bank vegetated was also 52%. The dominant elements composing the structure of the stream banks consisted of 83% sand/silt/clay, 10% bedrock, 5% cobble/gravel, and 2% boulder (Graph 10). Brush was the dominant vegetation type observed in 41% of the units surveyed. Additionally, 38% of the units surveyed had hardwood trees as the dominant vegetation type, and 14% had grass as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished for species composition and distribution in Lynch Creek in July and August, 2007. Water temperatures taken during the electrofishing period ranged from 56 to 64 degrees Fahrenheit. Air temperatures ranged from 71 to 80 degrees Fahrenheit. The sites were

sampled by D. Acomb (DFG), D. Resnik (DFG) and H. Fett (DFG).

In reach 2, one site was sampled starting approximately at Habitat Unit 61 and ending at Habitat Unit 77. The reach sites yielded thirty-one young-of-the-year steelhead/rainbow trout (SH/RT) five age 1+ SH/RT and eight California roach.

In reach 5 and 6, one site was sampled starting approximately at Habitat Unit 115 and ending at Habitat Unit 119. The reach site yielded fourteen age 1+ SH/RT, one age 2+ SH/RT, four foothill yellow-legged frog and seven pacific giant salamander.

The following chart displays the information yielded from these sites:

2007 Lynch Creek e-fish observations.

Date	Site #	Reference Point	Distance From Reference Point (ft.)	Steelhead/ Rainbow Trout			Non Salmonids Name species
				0+	1+	2+	
07/19/2007	621	Sonoma Mountain Parkway	250	31	5	0	8 California Roach
08/28/207	617	NA	NA	0	14	1	4 foothill yellow-legged frogs, 7 pacific gaint salamander

DISCUSSION

Lynch Creek is an F6 channel type for the first 2,743 feet of stream surveyed, an F4 channel type for the next 3,695 feet, an F3 channel type for the following 11,919 feet, an NA channel type for the next 14,006 feet, a B3 channel type for the following 1,379 feet and an A3 channel type for the remaining 5,241 feet.

The suitability of F6 channel types is rated “Good” for bank-placed boulders, and “Fair” for plunge weirs, single wing-deflectors, opposing wing-deflectors, boulder clusters and log cover.
The suitability of F4 channel types is rated “Good” for bank-placed boulders, “Fair” for plunge weirs, single wing-deflectors, opposing wing-deflectors, channel constrictors and log cover, and “Poor” for boulder clusters.
The suitability of F3 channel types is rated “Good” for single and opposing wing-deflectors and bank-placed boulders, and “Fair” for plunge weirs, channel constrictors, log cover and boulder clusters.
The suitability of B3 channel types is rated “Excellent for plunge weirs, log cover, single and

opposing wing deflectors, boulder clusters and bank-placed boulders.
The suitability of A3 channel types is rated "Good" for bank-placed boulders, "Fair" for plunge weirs, opposing wing deflectors and log cover, and "Poor" for boulder clusters and single wing-deflectors.

The water temperatures recorded on the survey days 6/21/2007 to 7/31/2007, ranged from 56 to 64 degrees Fahrenheit. Air temperatures ranged from 56 to 77 degrees Fahrenheit. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 16% of the total length of this survey, riffles 4%, and pools 1%. The pools are relatively shallow, with only 9 of the 24 (38%) pools having a maximum residual depth greater than 2 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. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Fifteen of the 24 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. Seven 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. Sediment sources in Lynch Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fifteen of the 24 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 was 18. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Lynch Creek. Boulders are the dominant cover type in pools followed by undercut banks. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 77%. Reach 1 had a canopy density of 70%, Reach 2 had a canopy density of 75%, Reach 3 had a canopy density of 86%, Reach 5 had a canopy density of 84%, and Reach 6 had a canopy density of 75%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 52% on each side. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

GENERAL RECOMMENDATIONS

Lynch Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

RECOMMENDATIONS

1) Access for migrating salmonids should be assessed, monitored and improved along the stream, particularly at all road crossings and culverts. Where needed crossings and culverts should be replaced or modified to improve fish passage. Potential barriers noted in the assessment were located at the following locations: At the mouth, a private drive in reach 3 and the upper crossing at Sonoma mountain road.

2) There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives should be explored with the grazier and developed if possible.

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

4) Where feasible, design and engineer pool enhancement structures to increase the number of pools in Lynch Creek and the 2 unnamed tributaries to Lynch Creek surveyed. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

5) 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 May through October temperature extreme period should be performed for 3 to 5 years.

6) Increase the canopy on Lynch Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. 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

7) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.

8) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its

tributaries.

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.

Position (ft)	Habitat Unit #	Comments
0	0001.00	Start of Survey: Before Unit 1: Mouth of Creek starts 50 feet from the river's edge. Fish Passage: (Apron) The water temperature below the structure was 58 F and the air temperature was 58 F. There is a possible fish barrier at the mouth. The dimensions of the structure are: 7 feet high by 15 feet long with a gradual rise. It is made out of cement and boulders and was likely built for grade control. Juveniles cannot pass during summer flows.
137	0002.00	Structures: Bridge # 1 is the Lynch Creek Trail Bridge (pedestrian bridge). The dimensions are: 11 feet high, 80 feet wide and 15 feet long. There is zero water to sill and it is not retaining gravel.
152	0003.00	Structures: bridge # 2: starts at the top of habitat unit 004 and is the southbound hwy 101 bridge. Its dimensions are: 13 feet high, 80 feet wide, and 113 feet long. The highway is 6 lanes here and there is a small separation between each bridge. It is not retaining gravel.
1192	0004.00	Structures: Bridge # 2 is the northbound Highway 101. Size: Height 7 ft, width 80 ft, length 15 feet. There is no down cutting and it is not retaining gravel.
1305	0005.00	Tributaries: Left bank trib 45 feet into unit. It was flowing and contributed less than 1% to the downstream flow. Water temperature at three different locations was 58 F (upstream, downstream, and in Trib 1) Not accessible to fish and none observed.
2354	0021.00	Structures: Bridge # 3. McDowell Road. Size: Height - 9 ft, width - 24, length - 15. There is no downcutting, but it is retaining gravel. It's a double box bridge; the left side is retaining lots of gravel whereas the right side is retaining some.
2743	0028.00	General Comment: Channel type change: F6 - F4. Reach 1 to Reach 2
3364	0041.00	General Comment: This is the end of Lucchesi park - the park started at unit 035.
3364	0041.00	Structures: Bridge #4 starts at the top of this unit.
3965	0042.00	Structures: Bridge # 4: Size: height - 9 ft, width - 26.5, and length - 58. It is located on Maria Drive. There is no downcutting, but it is retaining gravel. This is a double box bridge; the left side is retaining a good amount of gravel, right side retains some.

Position (ft)	Habitat Unit #	Comments
4945	0045.00	General Comment: SH/RT fry observed.
5174	0050.00	Structures: Boulder Weir
6063	0065.00	Structures: This is Bridge # 5 and it's located on Sonoma Mountain Parkway. Size: Height 7 ft, width 27 ft, length 136 ft
6199	0066.00	Structures: Bridge # 5: Size: Height 7 ft, Width 27 ft, Length 136. There is zero downcutting and it is not retaining gravel.
6438	0071.00	General Comment: Channel type change: F4 - F3, and Reach change: Reach 2 - Reach 3.
6822	0079.00	Access Points / Location: (Bridge) 36 ft into the unit there is a footbridge that is 6 feet wide and does not appear to affect the creek at all.
11069	0092.00	Structures: Bridge #6: Rooster Run Golf Coarse road bridge. Size: Height - 7.2, Width - 56, Length - 10 ft. There is no downcutting and it is not retaining gravel.
11434	0094.00	Structures: Bridge # 7: Rooster Run Golf Coarse road bridge. Size: Height - 7.3, width 56, and length 10. There is not any downcutting and it is not retaining gravel.
12121	0096.00	Structures: Culvert #1: This is located on a private drive next to the Rooster Run Golf Course. Size: Length - 18, Width - 5.7, height - 5.7. No downcutting, no water, its retaining 0.3 ft of gravel. May need maintenance; all three culverts are collapsing.
13873	0098.00	Structures: Bridge # 8: Located at Adobe Road. Size: Height 11 ft, width 26, Length 40. There is no downcutting and it is not retaining gravel.
15158	0100.00	General Comment: unidentified fish present.
15348	0105.00	Access Points / Location: (Bridge) WP007: 38.27980, 122.61744, taken at top of unit before bridge #9.
16173	0106.00	Access Points / Location: (Bridge) Bridge #9, lower Sonoma Mountain Road crossing. H11', W58', L32'. No downcutting or gravel retained. WP007: 38.27980, 122.61744. (taken at bottom of unit)
18357	0108.00	General Comment: Channel Type Change: F3=>NA, R3=>R4. HU108 is a non accessible habitat unit. WP013: 38.31323, 122.59709. Point taken at channel type change/top of unit.
32363	0109.00	General Comment: Channel Type Change: NA=>B3, R4-R5.
32406	0111.00	Bio Sample: (Bank Observation) Steelhead observed.
33742	0117.00	General Comment: HU117 begins new channel type: B3=>A3, R5=>6.
33918	0119.00	Bio Sample: (Bank Observation) Steelhead observed.
35346	0131.00	Tributaries: Trib #2 on left bank. No flow, dry trib, not accessible to fish. WP016: 38.31956, 122.59360. Taken at trib #2.
35357	0132.00	Erosion Site: (Bank) 200' into unit, LB erosion observed. Erosion site is active, 15' deep, 40' long and around 30 feet wide.

Position (ft)	Habitat Unit #	Comments
35976	0139.00	General Comment: There is a 3" diameter metal pipe running straight through culvert #2. Seems to be coming from vineyard close by. Top end of culvert is close to clogging with boulders and metal debris.
35976	0139.00	Access Points / Location: (Culvert) Culvert #2, Sonoma Mountain Road crossing. WP021: 38.32051, 122.59171. (taken at bottom of culvert unit) Culvert is 60' long corrugated metal pipe with a 4.2' diameter. Measured 3.5' of downcutting from outlet. Culvert is collapsing in the middle.
36036	0140.00	General Comment: Two cars in the creek, probably once used for bank stabilization.
36377	0141.00	Fish Passage: (Other) 505' into unit, there is a 5' high natural bedrock falls. Possible barrier to juvenile salmonids.
37383	0143.00	Access Points / Location: (Culvert) Culvert #3, private driveway. 35 foot plastic culvert, 2.5 foot diameter. Measured a 1 foot downcut. No retained gravel. Water barely flowing through culvert, WP023: 38.32238, 122.58809.
37481	0145.00	General Comment: Creek bed full of branches and brush trimmings.
37765	0147.00	Access Points / Location: (Culvert) Culvert #4, paved private drive. Plastic culvert is 40' long and 2.5' in diameter. No downcutting or gravel retained present.
38983	0148.00	End of Survey: End of survey at barbed wire fence near the top of Sonoma Mountain, Steep gradient, channel is dry and taking on the form of a small ditch. Channel ends soon and mountain top is only several hundred feet away. WP025: 38.32512, 122.58390.

REFERENCES

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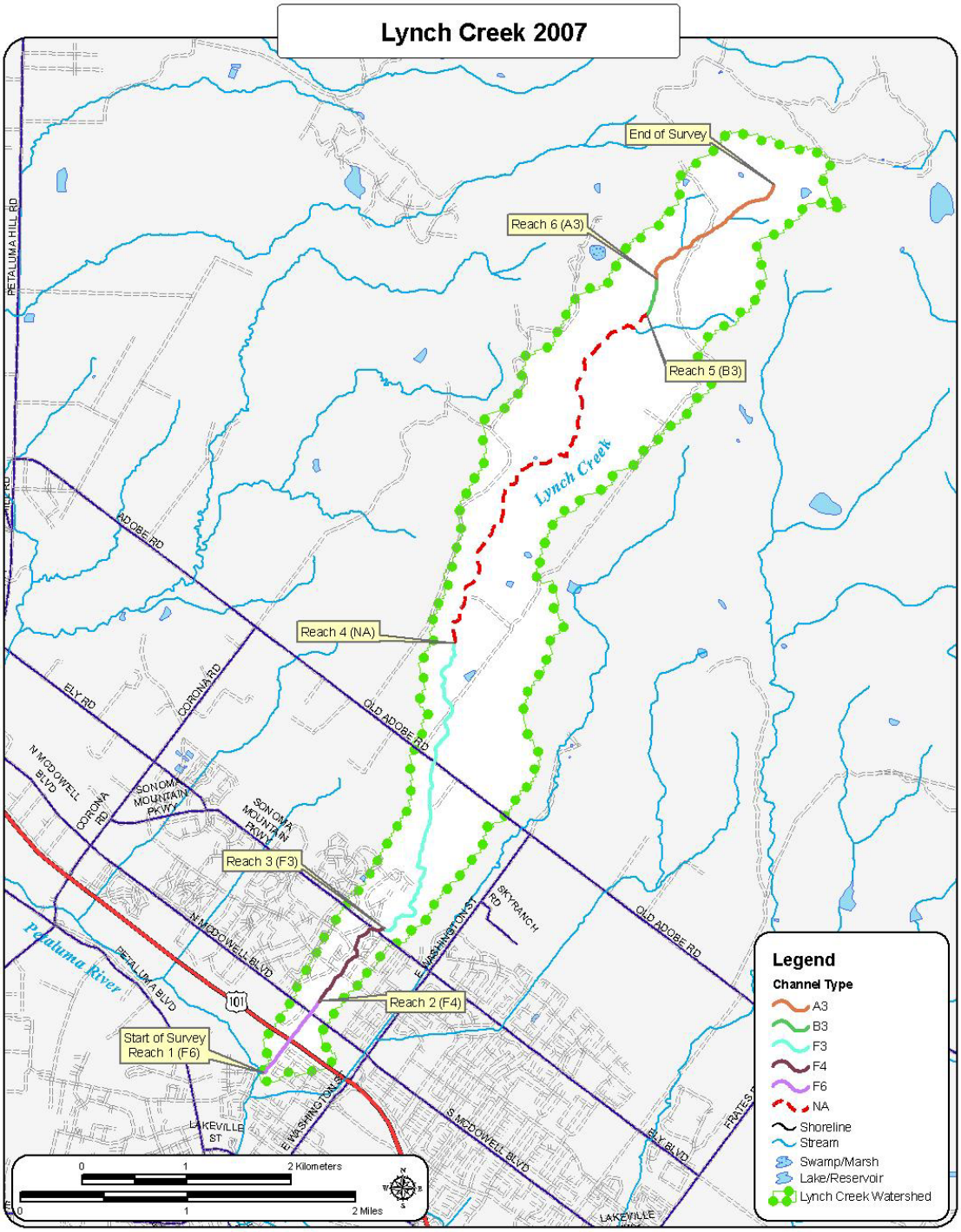
McCain, M., D. Fuller, L. Decker and K. Overton. 1990. Stream habitat classification and inventory procedures for northern California. FHC Currents. No.1. U.S. Department of Agriculture. Forest Service, Pacific Southwest Region.

Rosgen, D.L., 1994. A Classification of Natural Rivers. Catena, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.

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 - Root Wad 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 - Root Wad 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]	



L:\DFG\Watershed_Overview\San Pablo\Petaluma_River\Lynch_Creek_2007.mxd

Prepared by: Scott Webb, December 2007

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

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: Quad: COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
13	0	CULVERT	8.8	50	653	1.7									
25	0	DRY	16.9	599	14971	38.4									
49	12	FLATWATER	33.1	124	6059	15.5	7.0	0.7	1.3	724	35483	608	29780		8
1	0	NO SURVEY	0.7	14006	14006	35.9									
2	0	NO SURVEY MARSH	1.4	588	1177	3.0									
24	24	POOL	16.2	23	563	1.4	7.5	1.0	1.8	211	5068	319	7645	289	18
34	7	RIFFLE	23.0	46	1554	4.0	7.4	0.2	0.5	375	12757	112	3820		0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
148	43	38983	53309	41245

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: Quad: COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
33	6	LGR	22.3	45	1491	3.8	8.0	0.2	1.1	420	13874	129	4268		0	78
1	1	HGR	0.7	63	63	0.2	3.0	0.1	0.2	104	104	10	10		0	68
30	7	GLD	20.3	68	2053	5.3	9.0	1.0	2.4	856	25682	876	26295		5	74
4	1	RUN	2.7	66	265	0.7	5.0	0.3	1.0	314	1254	94	376		0	69
15	4	SRN	10.1	249	3741	9.6	4.0	0.3	1.3	596	8939	266	3988		16	66
5	5	MCP	3.4	17	85	0.2	5.0	0.8	1.7	89	447	88	440	72	9	80
1	1	STP	0.7	21	21	0.1	11.0	0.9	2.1	219	219	219	219	198	90	95
5	5	CRP	3.4	31	157	0.4	9.0	1.5	3.3	309	1547	589	2943	548	22	89
1	1	LSL	0.7	35	35	0.1	9.0	0.9	1.4	315	315	347	347	284	5	75
4	4	LSR	2.7	40	162	0.4	10.0	1.3	3.2	444	1774	726	2905	660	15	85
1	1	LSBo	0.7	43	43	0.1	11.0	1.0	1.8	473	473	520	520	473	10	50
7	7	PLP	4.7	9	60	0.2	5.0	0.8	2.2	42	294	39	272	35	15	84
25	0	DRY	16.9	599	14971	38.4										85
13	0	CUL	8.8	50	653	1.7										
1	0	NS	0.7	14006	14006	35.9										
2	0	MAR	1.4	588	1177	3.0										12

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
148	43	38983	54921	42583

Table 3 - Summary of Pool Types

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: **Quad:** COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Residual Vol (cu.ft.)	Mean Shelter Rating
6	6	MAIN	25	18	106	19	6.3	0.8	111	666	93	559	23
18	18	SCOUR	75	25	457	81	7.8	1.1	245	4402	354	6379	16

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
24	24	563	5068	6938

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: Quad: COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
4	LSR	17	0	0	1	25	2	50	1	25	0	0
5	MCP	21	0	0	5	100	0	0	0	0	0	0
5	CRP	21	0	0	1	20	2	40	2	40	0	0
1	LSBo	4	0	0	1	100	0	0	0	0	0	0
1	LSL	4	0	0	1	100	0	0	0	0	0	0
7	PLP	29	0	0	6	86	1	14	0	0	0	0
1	STP	4	0	0	0	0	1	100	0	0	0	0

Total Units	Total < 1 Foot Max Residual Depth	Total < 1 Foot % Occurrence	Total 1< 2 Feet Max Residual Depth	Total 1< 2 Feet % Occurrence	Total 2< 3 Feet Max Residual Depth	Total 2< 3 Feet % Occurrence	Total 3< 4 Feet Max Residual Depth	Total 3< 4 Feet % Occurrence	Total >= 4 Feet Max Residual Depth	Total >= 4 Feet % Occurrence
24	0	0	15	63	6	25	3	13	0	0

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover by Habitat Type

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007 **Dry Units:** 25

Confluence Location: **Quad:** COTATI **Legal Description:** T005R007S28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terrestrial Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
33	6	LGR	0	0	0	0	0	0	0	0	0
1	1	HGR	0	0	0	0	0	0	0	0	0
34	7	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
30	7	GLD	20	1	11	1	4	4	0	0	0
4	1	RUN	0	0	0	0	0	0	0	0	0
15	4	SRN	0	0	0	5	4	0	0	41	0
49	12	TOTAL FLAT	12	1	7	3	4	3	0	14	0
5	5	MCP	0	12	0	0	8	0	0	60	0
1	1	STP	15	0	0	15	0	0	5	65	0
5	5	CRP	27	20	0	2	11	0	0	0	0
1	1	LSL	0	0	80	0	20	0	0	0	0
4	4	LSR	18	8	15	10	0	0	0	0	0
1	1	LSBo	0	0	0	0	0	0	0	100	0
7	7	PLP	10	0	0	0	0	0	1	60	0
24	24	TOTAL POOL	12	8	6	3	5	0	1	37	0
13	0	CUL									
1	0	NS									
2	0	MAR									
148	43	TOTAL	10	5	5	2	4	1	0	24	0

Table 6 - Summary of Dominant Substrates by Habitat Type

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007 **Dry Units:** 25

Confluence Location: **Quad:** COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
33	17	LGR	29	18	41	12	0	0	0
1	1	HGR	0	0	100	0	0	0	0
30	13	GLD	46	8	38	8	0	0	0
4	1	RUN	0	0	100	0	0	0	0
15	4	SRN	0	0	0	50	25	25	0
5	5	MCP	0	40	40	0	0	20	0
1	1	STP	0	0	0	100	0	0	0
5	5	CRP	40	40	20	0	0	0	0
1	1	LSL	0	100	0	0	0	0	0
4	4	LSR	50	25	0	25	0	0	0
1	1	LSBo	100	0	0	0	0	0	0
7	7	PLP	0	0	57	29	0	14	0
13	4	CUL	25	0	50	25	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: **Quad:** COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
77	0	100	1	52	52

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: Lynch Creek LLID: 1226366382476 Drainage: Petaluma River
Survey Dates: 6/21/2007 to 7/31/2007 Survey Length (ft.): 38983 Main Channel (ft.): 38983 Side Channel (ft.): 0
Confluence Location: Quad: COTATI Legal Description: T05R07WS28 Latitude: 38:14:51.0N Longitude: 122:38:12.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F6
Reach Length (ft.): 2743
Riffle/Flatwater Mean Width (ft.): 9.5
BFW:
Range (ft.): 14 to 25
Mean (ft.): 23.9
Std. Dev.: 2.71
Base Flow (cfs): 0.0896
Water (F): 56 - 61 Air (F): 68 - 77
Dry Channel (ft.): 0

Canopy Density (%): 69.6
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 59.3
Dominant Shelter: Undercut Banks
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 10.0
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 0

Pools by Stream Length (%): 6.2
Pool Frequency (%): 14.8
Residual Pool Depth (%):
< 2 Feet Deep: 50.0
2 to 2.9 Feet Deep: 0.0
3 to 3.9 Feet Deep: 50.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.4
Mean Pool Shelter Rating: 13

Pool Tail Substrate (%): Silt/Clay: 75.0 Sand: 0.0 Gravel: 25.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 25.0 2. 0.0 3. 0.0 4. 0.0 5. 75.0

STREAM REACH: 2

Channel Type: F4
Reach Length (ft.): 3695
Riffle/Flatwater Mean Width (ft.): 7.7
BFW:
Range (ft.): 19 to 27
Mean (ft.): 21.5
Std. Dev.: 2.70
Base Flow (cfs): N/A
Water (F): 56 - 62 Air (F): 68 - 76
Dry Channel (ft.): 1694

Canopy Density (%): 75.2
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 67.3
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles: 0
Pools: 2
Flat: 0

Pools by Stream Length (%): 3.9
Pool Frequency (%): 9.3
Residual Pool Depth (%):
< 2 Feet Deep: 50.0
2 to 2.9 Feet Deep: 25.0
3 to 3.9 Feet Deep: 25.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.35
Mean Pool Shelter Rating: 33

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 25.0 Gravel: 25.0 Sm Cobble: 50.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 25.0 2. 25.0 3. 25.0 4. 0.0 5. 25.0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: F3
Reach Length (ft.): 11919
Riffle/Flatwater Mean Width (ft.): 7.0
BFW:
Range (ft.): 17 to 27
Mean (ft.): 22.7
Std. Dev.: 3.52
Base Flow (cfs): N/A
Water (F): 57 - 64 Air (F): 62 - 77
Dry Channel (ft.): 10723

Canopy Density (%): 85.9
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 55.4
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 20.0
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 0

Pools by Stream Length (%): 1.0
Pool Frequency (%): 10.8
Residual Pool Depth (%):
< 2 Feet Deep: 25.0
2 to 2.9 Feet Deep: 75.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.025
Mean Pool Shelter Rating: 6

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 25.0 Sm Cobble: 25.0 Lg Cobble: 50.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 75.0 2. 0.0 3. 0.0 4. 25.0 5. 0.0

STREAM REACH: 4

Channel Type: NA
Reach Length (ft.): 14006
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.):
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): Air (F):
Dry Channel (ft.):

Canopy Density (%):
Coniferous Component (%):
Hardwood Component (%):
Dominant Bank Vegetation:
Vegetative Cover (%):
Dominant Shelter:
Dominant Bank Substrate Type:
Occurrence of LWD (%):
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%):
Pool Frequency (%):
Residual Pool Depth (%):
< 2 Feet Deep:
2 to 2.9 Feet Deep:
3 to 3.9 Feet Deep:
>= 4 Feet Deep:
Mean Max Residual Pool Depth (ft.):
Mean Pool Shelter Rating:

Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:
Embeddedness Values (%): 1. 2. 3. 4. 5.

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: B3
Reach Length (ft.): 1379
Riffle/Flatwater Mean Width (ft.): 4.0
BFW:
Range (ft.): 27 to 27
Mean (ft.): 27
Std. Dev.: 0
Base Flow (cfs): N/A
Water (F): 61 - 61 Air (F): 56 - 56
Dry Channel (ft.): 201

Canopy Density (%): 83.8
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 66.0
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools: 16
Flat: 0

Pools by Stream Length (%): 2.7
Pool Frequency (%): 37.5
Residual Pool Depth (%):
< 2 Feet Deep: 33.3
2 to 2.9 Feet Deep: 66.7
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.8
Mean Pool Shelter Rating: 58

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 0.0 Sm Cobble: 100. Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 33.3 2. 66.7 3. 0.0 4. 0.0 5. 0.0

STREAM REACH: 6

Channel Type: A3
Reach Length (ft.): 5241
Riffle/Flatwater Mean Width (ft.): 3.7
BFW:
Range (ft.): 14 to 27
Mean (ft.): 19.59
Std. Dev.: 5. 8
Base Flow (cfs): N/A
Water (F): 59 - 62 Air (F): 56 - 75
Dry Channel (ft.): 2353

Canopy Density (%): 74.9
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 25.0
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles: 0
Pools: 3
Flat: 1

Pools by Stream Length (%): 1.7
Pool Frequency (%): 28.1
Residual Pool Depth (%):
< 2 Feet Deep: 100.0
2 to 2.9 Feet Deep: 0.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.25
Mean Pool Shelter Rating: 5

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 55.6 Sm Cobble: 11.1 Lg Cobble: 11.1 Boulder: 22.2 Bedrock: 0.0
Embeddedness Values (%): 1. 11.1 2. 55.6 3. 0.0 4. 0.0 5. 33.3

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: **Quad:** COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Bedrock	5	4	10.5
Boulder	1	1	2.3
Cobble/Gravel	2	2	4.7
Sand/Silt/Clay	35	36	82.6

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Grass	6	6	14.0
Brush	17	18	40.7
Hardwood Trees	18	15	38.4
Coniferous Trees	0	0	0.0
No Vegetation	2	4	7.0

Total Stream Cobble Embeddedness Values: 3

Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

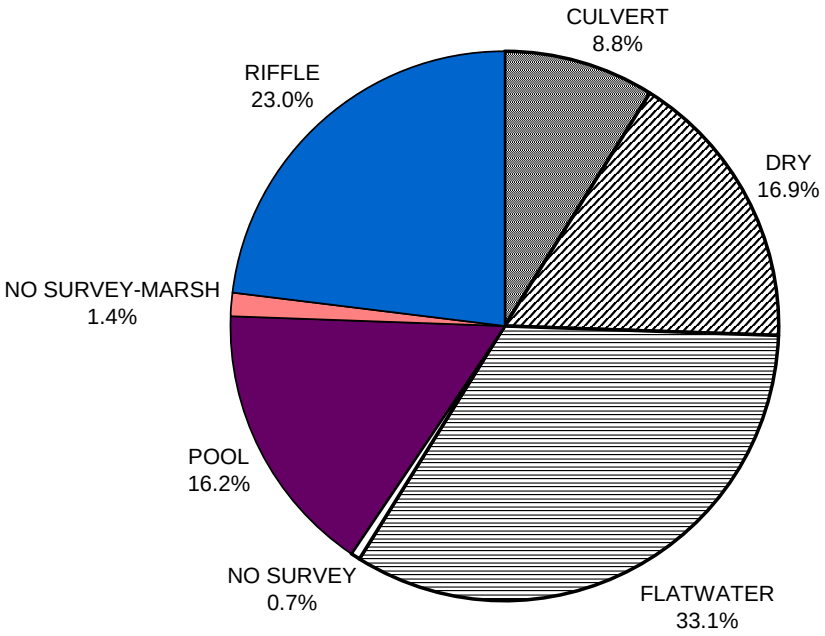
Stream Name: Lynch Creek **LLID:** 1226366382476 **Drainage:** Petaluma River

Survey Dates: 6/21/2007 to 7/31/2007

Confluence Location: Quad: COTATI **Legal Description:** T05R07WS28 **Latitude:** 38:14:51.0N **Longitude:** 122:38:12.0W

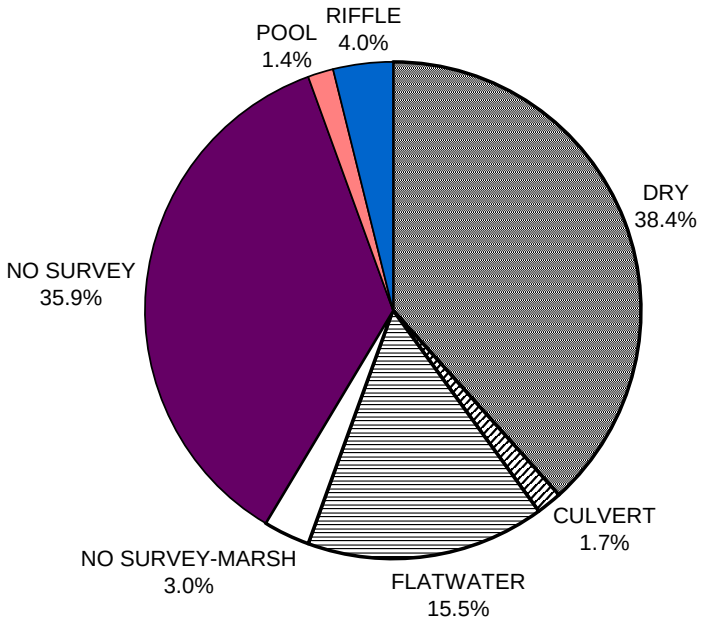
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	12	12
SMALL WOODY DEBRIS (%)	0	1	8
LARGE WOODY DEBRIS (%)	0	7	6
ROOT MASS (%)	0	3	3
TERRESTRIAL VEGETATION (%)	0	4	5
AQUATIC VEGETATION (%)	0	3	0
WHITEWATER (%)	0	0	1
BOULDERS (%)	0	14	37
BEDROCK LEDGES (%)	0	0	0

LYNCH CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE



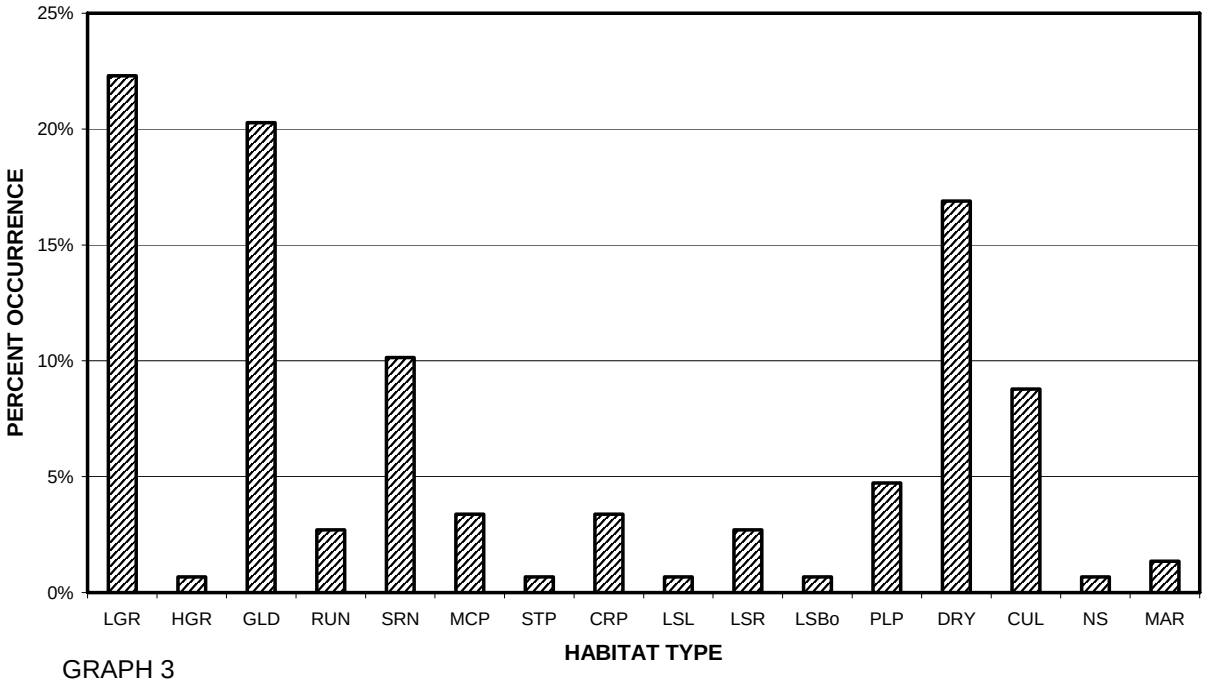
GRAPH 1

LYNCH CREEK 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH



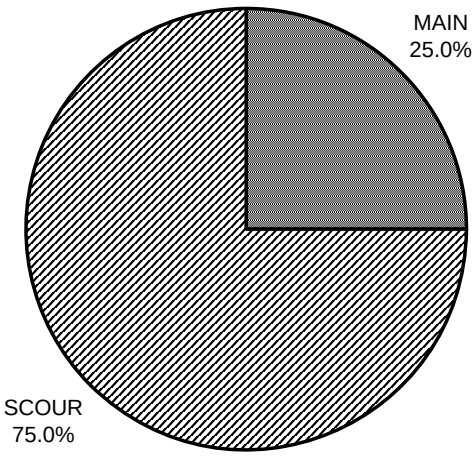
GRAPH 2

LYNCH CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE



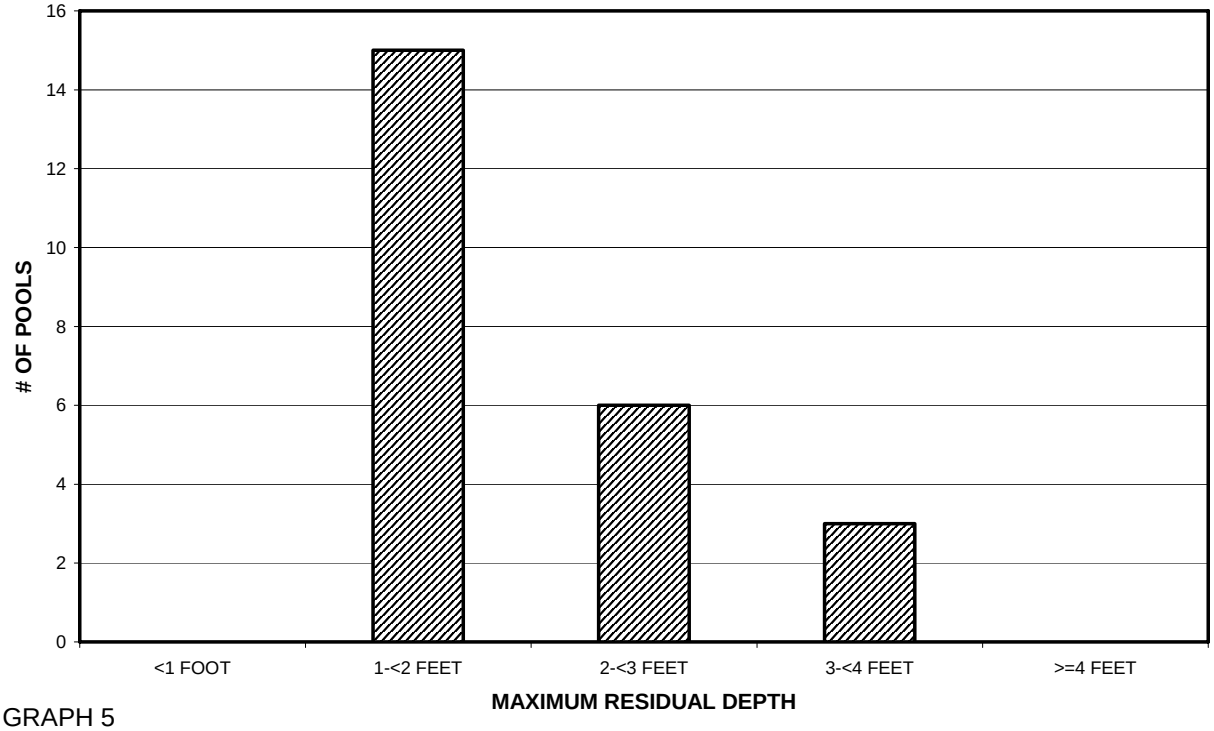
GRAPH 3

LYNCH CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE



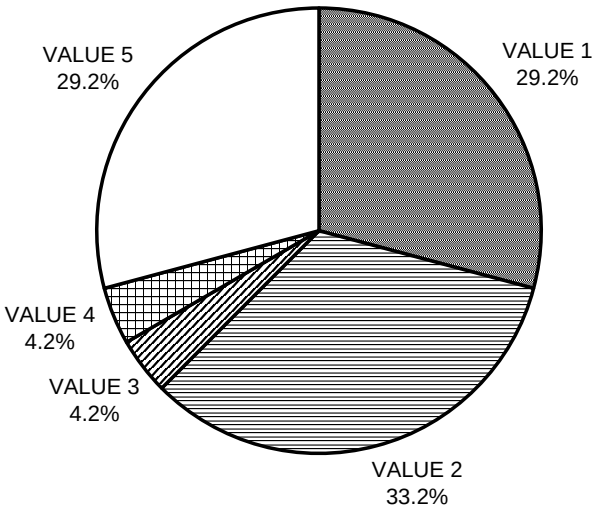
GRAPH 4

LYNCH CREEK 2007
MAXIMUM DEPTH IN POOLS



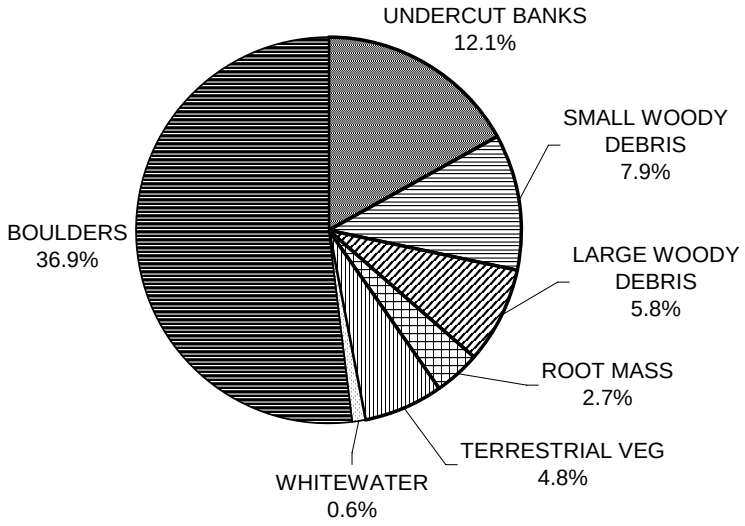
GRAPH 5

LYNCH CREEK 2007
PERCENT EMBEDDEDNESS



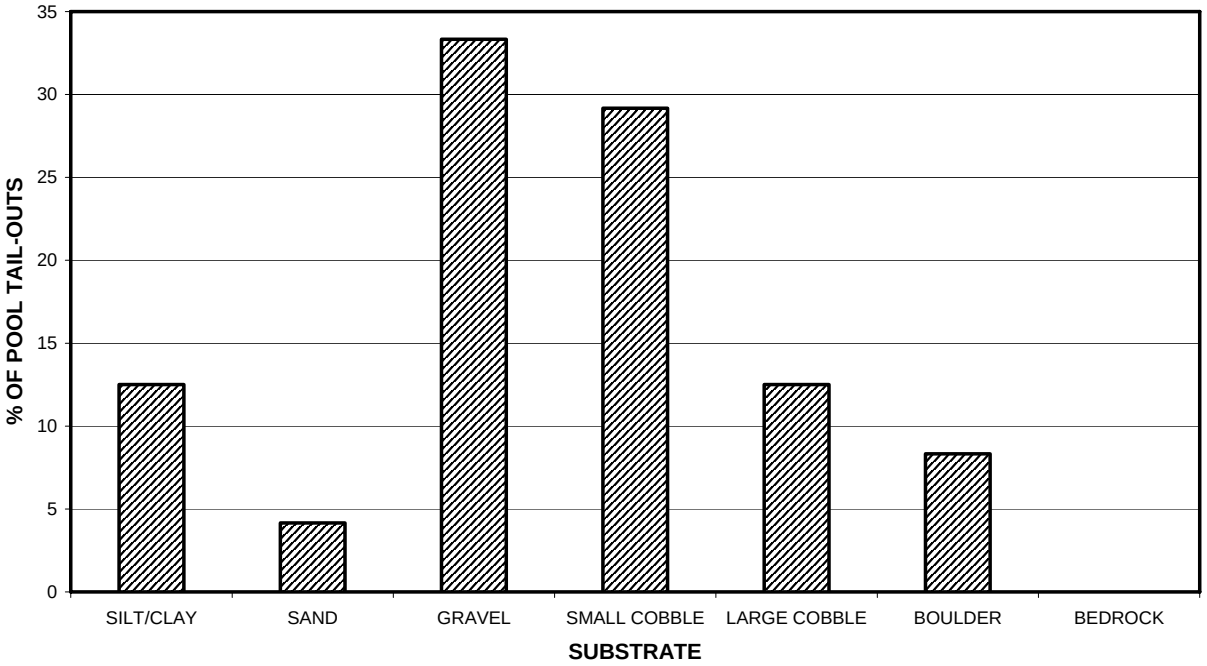
GRAPH 6

LYNCH CREEK 2007
MEAN PERCENT COVER TYPES IN POOLS



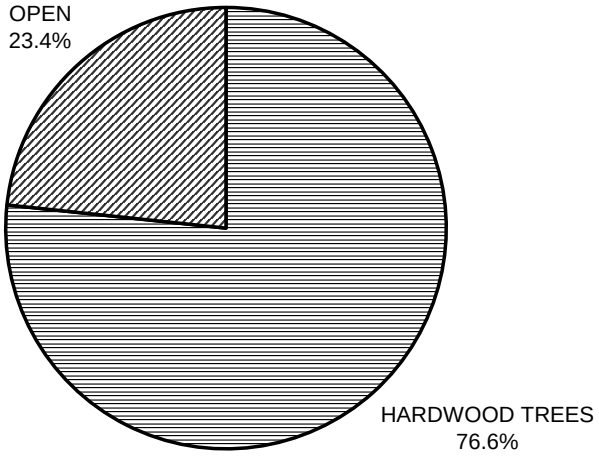
GRAPH 7

LYNCH CREEK 2007
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



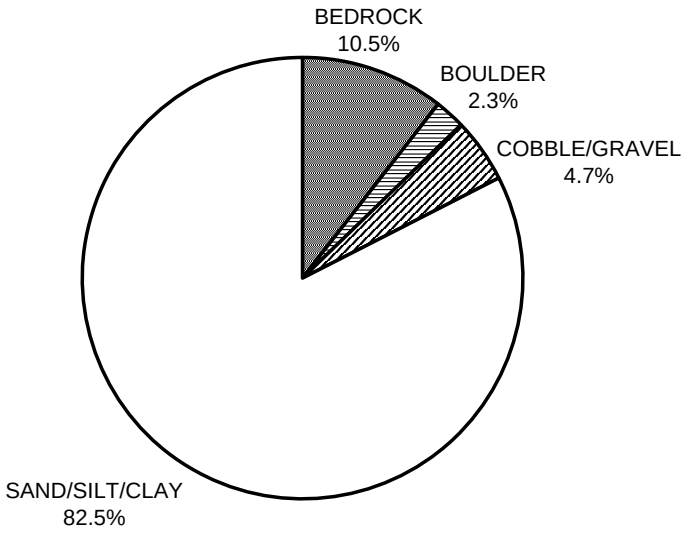
GRAPH 8

LYNCH CREEK 2007
MEAN PERCENT CANOPY



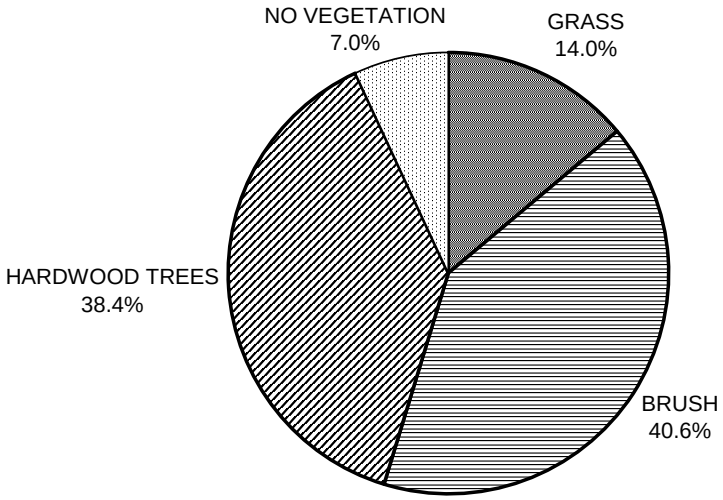
GRAPH 9

LYNCH CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

LYNCH CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11