STREAM INVENTORY REPORT

Cheney Gulch

INTRODUCTION

A stream inventory was conducted during 10/24/2006 to 10/27/2006 on Cheney Gulch. The survey began at the confluence with Bodega Harbor and extended upstream approximately 3 miles. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Cheney Gulch.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, 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.

WATERSHED OVERVIEW

Cheney Gulch is a tributary to Bodega Harbor, located in Sonoma County, California (Map 1). Cheney Gulch's legal description at the confluence with Bodega Harbor is T06N R11W S00. Its location is 38°19'00" north latitude and 123°02'09" west longitude, LLID number 1230358383167. Cheney Gulch is a first order stream and has approximately 3.9 miles of intermittent stream according to the USGS Bodega Head 7.5 minute quadrangle. Cheney Gulch drains a watershed of approximately 4.2 square miles. Elevations range from sea level at the mouth of the creek to 396 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is entirely privately owned and is primarily managed for rangeland. Vehicle access exists via Hwy 1.

METHODS

The habitat inventory conducted in Cheney Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game (DFG) staff that conducted the inventory were trained in standardized habitat inventory methods by DFG. 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 and 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.

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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 Cheney Gulch 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". Cheney Gulch 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 Cheney Gulch, 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 Cheney Gulch, 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 Cheney Gulch, 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 Cheney Gulch, 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.

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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.

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 Cheney Gulch 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

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HABITAT INVENTORY RESULTS

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

The habitat inventory of 10/24/2006 to 10/27/2006, was conducted by Henning Fett (DFG) and Derek Acomb (DFG). The total length of the stream surveyed was 15,732 feet.

Stream flow was not measured on Cheney Gulch.

Cheney Gulch is an F6 channel type for 4,201 feet of the stream surveyed (Reach 1), an F4 channel type for 4,272 feet of the stream surveyed (Reach 2), a B3 channel type for 3,925 feet of the stream surveyed (Reach 3), a B6 channel type for 3,334 feet of the stream surveyed (Reach 4).

An F classification indicates an entrenched meandering riffle/pool channel on low gradients with high width/depth ratio. An F6 has sand dominated substrate while an F4 is gravel-dominated. The B type channel is characterized as moderately entrenched with a moderate gradient, having a riffle dominated channel with infrequently spaced pools and a very stable plane and profile with stable banks. A B3 has a cobble dominant substrate and a B6 has a silt/clay dominant substrate.

Water temperatures taken during the survey period ranged from 45 to 63 degrees Fahrenheit. Air temperatures ranged from 52 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 3.6% not surveyed due to marsh units, 10.9% culvert units, 18.2% pool units, 25.5% dry units, 29.1% flatwater units and 12.7% riffle units (Graph 1). Based on total length of Level II habitat types there were 26.1% nosurvey marsh units, 1.8% culvert units, 2.3% pool units, 55.9% dry units, 12.0% flatwater units and 1.9% riffle units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 18% Mid-Channel Pool units, 25% Dry units, and 20% Glide units (Graph 3). Based on percent total length, the most frequent habitat types were found to be 26% Not Surveyed due to marsh units, 56% Dry units, and 11% Glide units.

A total of 10 pools were identified (Table 3). Main Channel pools were encountered at 100%, and comprised 100% 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. Five of the 10 pools (50%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 10 pool tail-outs measured, 1 had a value of 1 (10%); 1 had a value of 2 (10%); 1 had a value of 3 (10%); 3 had a value of 4 (30%); 4 had a value of 5 (40%) (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 unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

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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 12, and pool habitats had a mean shelter rating of 18 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 18 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial Vegetation is the dominant cover type in Cheney Gulch. Graph 7 describes the pool cover in Cheney Gulch. Terrestrial Vegetation is the dominant pool cover type followed by aquatic vegetation.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. A silt/clay substrate type was observed in 30% of pool tail-outs, gravel observed in 20% of pool tail-outs, small cobble observed in 20% of pool tail-outs, and bedrock observed in 20% of pool tail-outs.

The mean percent canopy density for the surveyed length of Cheney Gulch was 62%. The mean percentages of hardwood and coniferous trees were 99% and 1%, respectively. Thirty-eight percent of the canopy was open (Table 7). Graph 9 describes the mean percent canopy in Cheney Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 76% and the mean percent left bank vegetated was 68% (Table 7). The dominant elements composing the structure of the stream banks consisted of 9% bedrock, 24% cobble/gravel and 68% sand/silt/clay (Graph 10). Both Hardwood trees and Grass were dominant vegetation types each observed in 38% of the units surveyed. Additionally, 24% of the units surveyed had Brush as the dominant vegetation type. (Graph 11).

DISCUSSION

Cheney Gulch is an F6 channel type for the first 4,201 feet of stream surveyed, F4 channel type for the next 4,272 feet, B3 channel type for the next 3,925 feet, and a B6 habitat type for the remaining 3,334 feet. The suitability of F6 channel types for fish habitat improvement structures is as follows: good for bank placed boulders; fair for plunge weirs, boulder clusters, single and opposing wing deflectors, and log cover. The suitability of F4 channel types is the same as F6 channel types except it is poor for boulder clusters. The suitability of B3 channel types is excellent for plunge weirs, boulder clusters, bank placed boulders, single and opposing wing deflectors, and log cover. The suitability of B6 habitat types is: excellent for bank placed boulders and log cover; good for plunge weirs, single and opposing wing deflectors, and channel constrictors; and fair for boulder clusters.

The water temperatures recorded on the survey days 10/24/2006 to 10/27/2006, ranged from 45 to 63 degrees Fahrenheit. Air temperatures ranged from 52 to 72 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 12% of the total length of this survey, riffles 2%, pools 2%,

culverts 2%, and dry units 56% (26% were nosurvey_marsh units). The pools are relatively shallow, with 5 of the 10 (50%) pools having a maximum residual depth less than or equal to 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.

Two of the 10 pool tail-outs measured had embeddedness ratings of 1 or 2. Four of the pool tail-outs had embeddedness ratings of 3 or 4. Four 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 Cheney Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Six of the 10 pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 18 and for flatwater habitats it was 12. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Terrestrial Vegetation in Cheney Gulch. Terrestrial Vegetation is the dominant cover type in pools followed by aquatic vegetation. 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 62%. Reach 1 had a canopy density of 75%, Reach 2 had a canopy density of 91%, Reach 3 had a canopy density of 69%, and reach 4 had a canopy density of 33%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 76% and 68%, respectively. 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 MANAGEMENT RECOMMENDATIONS

Cheney Gulch 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.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES AND RECOMMENDATIONS

1) Access for migrating salmonids should be assessed at all road crossings and culverts. Specifically culverts #3, #4 and #5 and the Gabion dam/ bedrock falls in Habitat unit # 40 should be evaluated for fish passage. Where needed crossings and culverts should be replaced or modified to improve fish passage.

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

4) 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.

5) Cheney Gulch would benefit from utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.

6) 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.

7) 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.

8) Increase the canopy in Reaches 3 and 4 on Cheney Gulch 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 control projects.

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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: Tidal slough with open areas and lots of trees. It is mostly marsh with many channels.
1459	0002.00	Restarted survey on down stream end of culvert.
1459	0002.00	Structures: Culvert #1, double box L65 W10 H7 Down cutting: 2' Ht. culvert lip to H2O level: 2' Not retaining gravel
1557	0004.00	General Comment: Channel type changes from an F6 (Reach 1) to an F4 (Reach 2) It is mostly marsh with many channels. There are wide open areas with lots of trees.
4201	0005.00	Structures: Culvert #2 L60 W12 No down cutting Retaining sand Maintenance required: over half filled in with sand
4261	0006.00	General Comment: Left creek at end of unit #5 WP:138
4261	0006.00	Tributaries: Dry tributary on left bank at culvert outfall
8423	0007.00	General Comment: At end of unit #007, channel change from F4 (reach 2) to B3 (reach 3).
8423	0007.00	Structures: Culvert #3, box L50 W8 H7 Down cutting: yes - 10' Not retaining gravel
8473	0008.00	General Comment: WP: 139, Found Car
11476	0026.00	General Comment: Unidentified fish, possibly Cal. Roach
11650	0029.00	General Comment: Unidentified fish
11889	0033.00	General Comment: Spring on right bank at 15' into unit
12206	0040.00	General Comment: Channel type change at end of unit #040, from B3 (reach 3) to B6 (reach 4).
12206	0040.00	Structures: WP: 143 Dam, upstream
12474	0043.00	General Comment: WP: 145

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Position (ft.)	Habitat Unit #	Comments
12474	0043.00	Structures: Culvert #4 L31 W2 H2 No down cutting, Ht. culvert lip to H2O level: 1', Not retaining gravel Brand new, plastic, Concrete ford crossing over culvert, will probably cause more down, cutting, and upstream adjustment.
12474	0043.00	Fish Passage:
14413	0048.00	General Comment: WP: 147, end of unit #48
15324	0049.00	Structures: Culvert #5 L15 W6 H5 Down cutting: 0.7" Ht. culvert lip to H2O: 0.9" Not retaining gravel Maintenance required: remove flash board dam
15324	0049.00	Fish Passage: (Dam) Fish barrier, removal of flash board dam recommended
15637	0054.00	General Comment: Fish present WP: 148, end of pool
15637	0054.00	Structures: Culvert on left bank
15667	0055.00	Structures: Culvert #6 (double) L65 W4 H4 x 2 No down cutting Not retaining gravel Back flooded Road name: Hwy 1 MP 6.65
15732	0055.00	End of survey due to lack of access.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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.

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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]	

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

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: Quad: BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

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
6	6	CULVERT	10.9	48	286	1.8	8.7			472	2832				
14	0	DRY	25.5	628	8787	55.9									
16	7	FLATWATER	29.1	118	1891	12.0	4.3	0.6	1.3	339	5430	300	4799		12
2	0	NOSURVEY_ MARSH	3.6	2052	4103	26.1									
10	10	POOL	18.2	36	360	2.3	7.3	1.4	2.3	243	2429	388	3881	381	18
7	2	RIFFLE	12.7	44	305	1.9	2.0	0.1	0.2	63	440	6	44		0

Total Units	Total Units Fully Meassured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
55	25	15732	11130	8724

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: Quad: BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

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 (%)
7	2	LGR	12.7	44	305	1.9	2.0	0.1	0.2	63	440	6	44		0	65
11	6	GLD	20.0	153	1687	10.7	4.0	0.6	3.5	388	4263	348	3831		14	54
5	1	RUN	9.1	41	204	1.3	3.0	0.2	1.0	50	252	10	50		0	78
10	10	MCP	18.2	36	360	2.3	7.0	1.4	5.9	243	2429	388	3881	381	18	53
14	0	DRY	25.5	628	8787	55.9										76
6	6	CUL	10.9	48	286	1.8	9.0			472	2832					
2	0	MAR	3.6	2052	4103	26.1										74

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
55	25	15732	10215	7806

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Table 3 - Summary of Pool Types

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

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 Resid. Vol (cu.ft.)	Mean Shelter Rating
10	10	MAIN	100	36	360	100	7.3	1.4	243	2429	381	3806	18

Total Units	Total Units Fully Meassured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
10	10	360	2429	3806

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

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

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 Occurence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
10	MCP	100	0	0	5	50	3	30	1	10	1	10

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Feet Max Resid. Depth	Total 1< 2 Feet % Occurrence	Total 2< 3 Feet Max Resid. Depth	Total 2< 3 Feet % Occurrence	Total 3< 4 Feet Max Resid. Depth	Total 3< 4 Feet % Occurrence	Total >= 4 Feet Max Resid. Depth	Total >= 4 Feet % Occurrence
10	0	0	5	50	3	30	1	10	1	10

Mean Maximum Residual Pool Depth (ft): 2.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
7	2	LGR	0	0	0	0	0	0	0	0	0
11	5	GLD	0	12	0	0	28	20	0	0	0
5	1	RUN	0	0	0	0	0	0	0	0	0
10	9	MCP	0	0	10	1	24	11	0	0	9
6	0	CUL									
2	0	MAR									

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

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
7	2	LGR	0	0	100	0	0	0	0
11	5	GLD	100	0	0	0	0	0	0
5	1	RUN	100	0	0	0	0	0	0
10	9	MCP	78	11	0	0	0	0	11
6	0	CUL	0	0	0	0	0	0	0
2	0	MAR	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

Habitat Units	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
62	1	99	0	76	68

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: Cheney Gulch LLID: 1230358383167 Drainage: Bodega Harbor
Survey Dates: 10/24/2006 to 10/27/2006 Survey Length (ft.): 15732 Main Channel (ft.): 15732 Side Channel (ft.): 0
Confluence Location: Quad: BODEGA HEAD Legal Description: T06N R11W S00 Latitude: 38:19:00.0N Longitude: 123:02:09.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F6	Canopy Density (%): 74.7	Pools by Stream Length (%): 0.8
Reach Length (ft.): 4201	Coniferous Component (%): 0.0	Pool Frequency (%): 25.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%): 100.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation:	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter:	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type:	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 52 - 52 Air (F): 56 - 56	LWD per 100 ft.:	Mean Pool Shelter Rating:
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	

Pool Tail Substrate (%): Silt/Clay: 100. Sand: 0.0 Gravel: 0.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 0.0 2. 0.0 3. 0.0 4. 0.0 5. 100.0

Cheney Gulch

STREAM REACH: 2

Channel Type: F4
Reach Length (ft.): 4272
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 52 - 52 Air (F): 56 - 56
Dry Channel (ft.): 4162

Canopy Density (%): 91.0
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation:
Vegetative Cover (%): 0.0
Dominant Shelter:
Dominant Bank Substrate Type:
Occurrence of LWD (%):
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 0.0
Pool Frequency (%): 0.0
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. 0.0

STREAM REACH: 3

Channel Type: B3
Reach Length (ft.): 3925
Riffle/Flatwater Mean Width (ft.): 3.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 49 - 52 Air (F): 56 - 72
Dry Channel (ft.): 3037

Canopy Density (%): 69.4
Coniferous Component (%): 1.1
Hardwood Component (%): 98.9
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 67.5
Dominant Shelter: Terrestrial Veg.
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles: 0
Pools: 0
Flat: 0

Pools by Stream Length (%): 3.9
Pool Frequency (%): 15.2
Residual Pool Depth (%):
< 2 Feet Deep: 60.0
2 to 2.9 Feet Deep: 20.0
3 to 3.9 Feet Deep: 20.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.82
Mean Pool Shelter Rating: 22

Pool Tail Substrate (%): Silt/Clay: 40.0 Sand: 0.0 Gravel: 0.0 Sm Cobble: 40.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 20.0
Embeddedness Values (%): 1. 20.0 2. 20.0 3. 20.0 4. 20.0 5. 20.0

Cheney Gulch

STREAM REACH: 4

Channel Type: B6

Reach Length (ft.): 3334

Riffle/Flatwater Mean Width (ft.): 4.3

BFW:

Range (ft.): to

Mean (ft.):

Std. Dev.:

Base Flow (cfs): 0

Water (F): 45 - 63 Air (F): 52 - 67

Dry Channel (ft.): 1588

Canopy Density (%): 33.0

Coniferous Component (%): 0.0

Hardwood Component (%): 100.0

Dominant Bank Vegetation: Grass

Vegetative Cover (%): 78.2

Dominant Shelter: Aquatic Vegetation

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 12.9

LWD per 100 ft.:

Riffles:

Pools: 2

Flat: 0

Pools by Stream Length (%): 5.2

Pool Frequency (%): 26.7

Residual Pool Depth (%):

< 2 Feet Deep: 25.0

2 to 2.9 Feet Deep: 50.0

3 to 3.9 Feet Deep: 0.0

>= 4 Feet Deep: 25.0

Mean Max Residual Pool Depth (ft.): 2.95

Mean Pool Shelter Rating: 13

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 50.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 25.0 Bedrock: 25.0

Embeddedness Values (%): 1. 0.0 2. 0.0 3. 0.0 4. 50.0 5. 50.0

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

Mean Percentage of Dominant Stream Bank

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Bedrock	1	2	8.8
Boulder	0	0	0.0
Cobble/Gravel	5	3	23.5
Sand/Silt/Clay	11	12	67.6

Mean Percentage of Dominant Stream Bank

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Grass	6	7	38.2
Brush	5	3	23.5
Hardwood Trees	6	7	38.2
Coniferous Trees	0	0	0.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness 4

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

Stream Name: Cheney Gulch **LLID:** 1230358383167 **Drainage:** Bodega Harbor

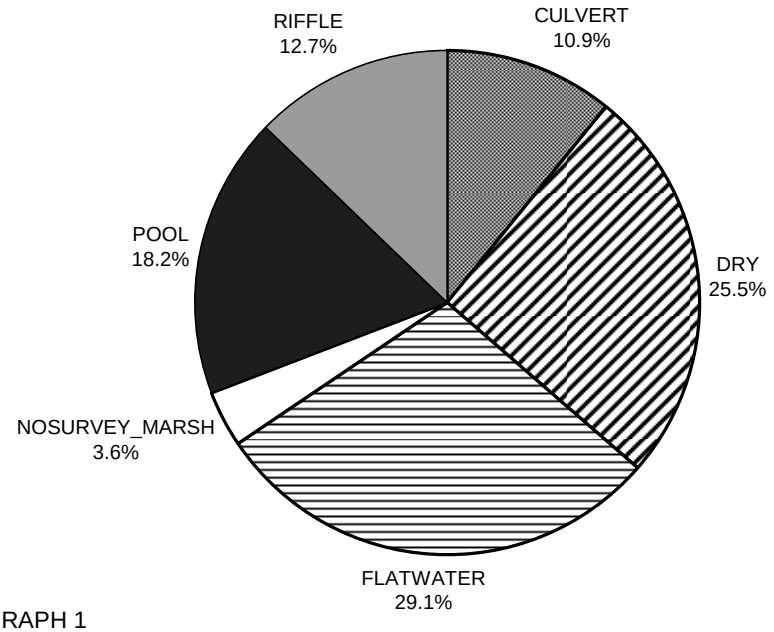
Survey Dates: 10/24/2006 to 10/27/2006

Confluence Location: **Quad:** BODEGA HEAD **Legal Description:** T06N R11W S00 **Latitude:** 38:19:00.0N **Longitude:** 123:02:09.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	0
SMALL WOODY DEBRIS (%)	0	10	0
LARGE WOODY DEBRIS (%)	0	0	10
ROOT MASS (%)	0	0	1
TERRESTRIAL VEGETATION (%)	0	23	24
AQUATIC VEGETATION (%)	0	17	11
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	9

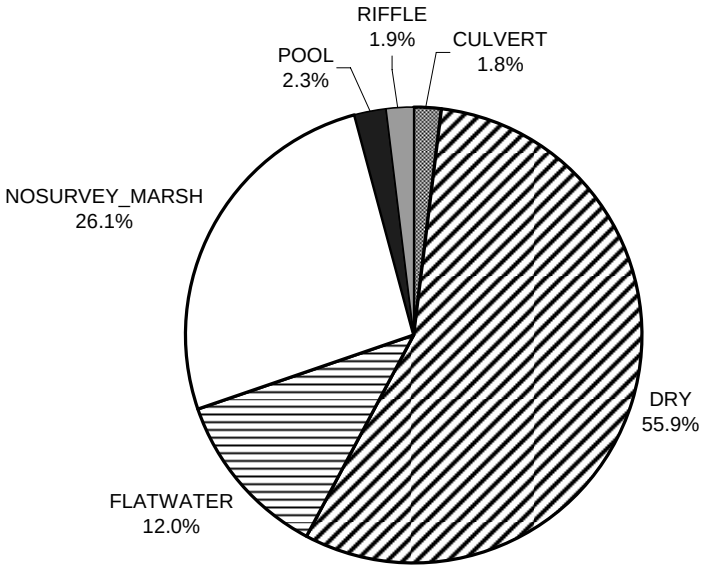
Cheney Gulch

CHENEY GULCH 2006
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

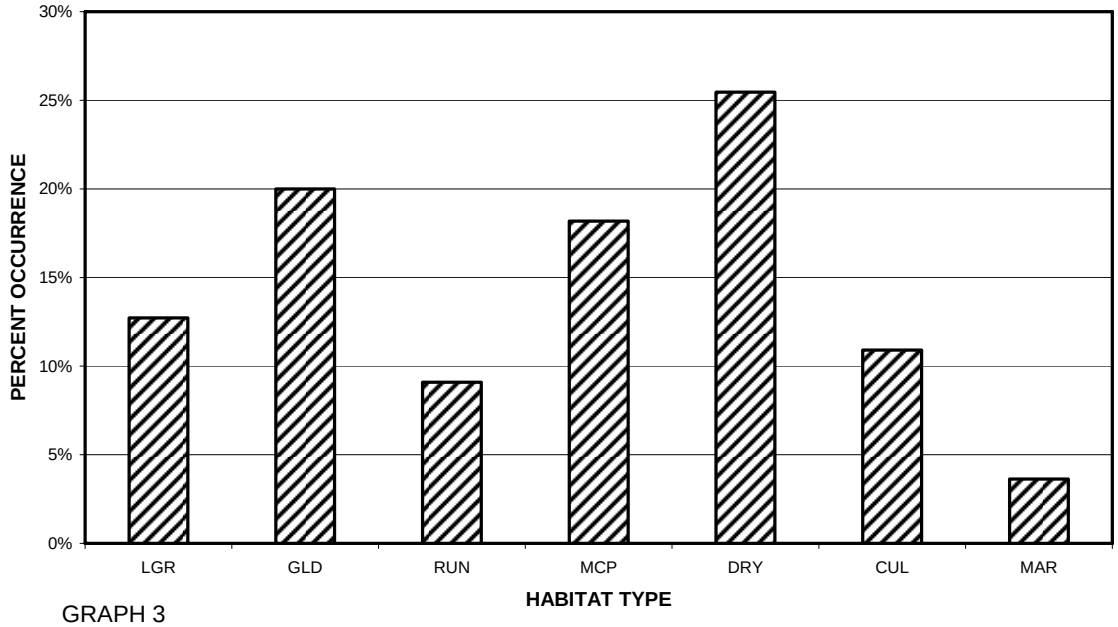
CHENEY GULCH 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

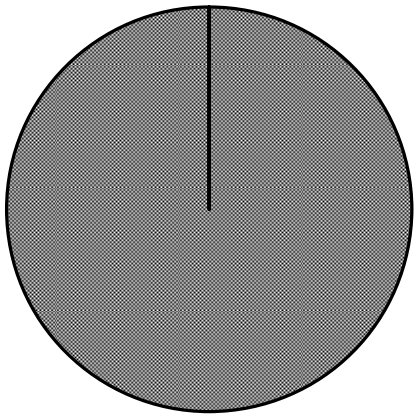
Cheney Gulch

CHENEY GULCH 2006
HABITAT TYPES BY PERCENT OCCURRENCE



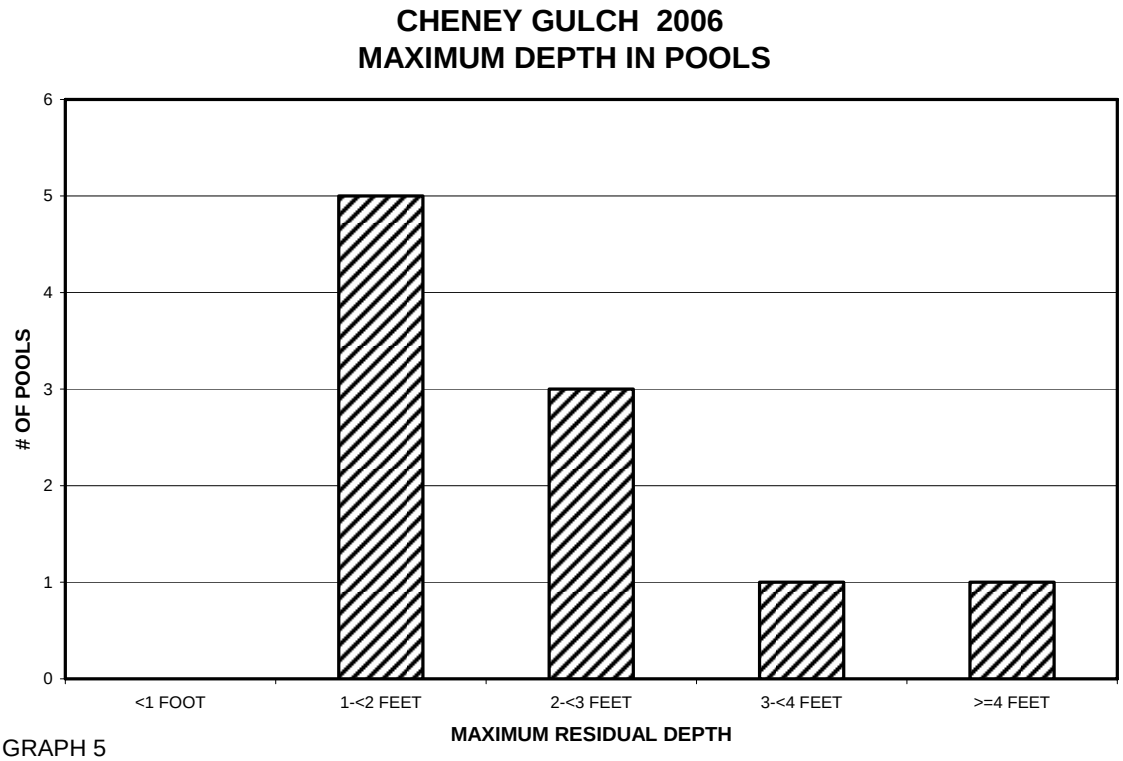
GRAPH 3

CHENEY GULCH 2006
POOL TYPES BY PERCENT OCCURRENCE

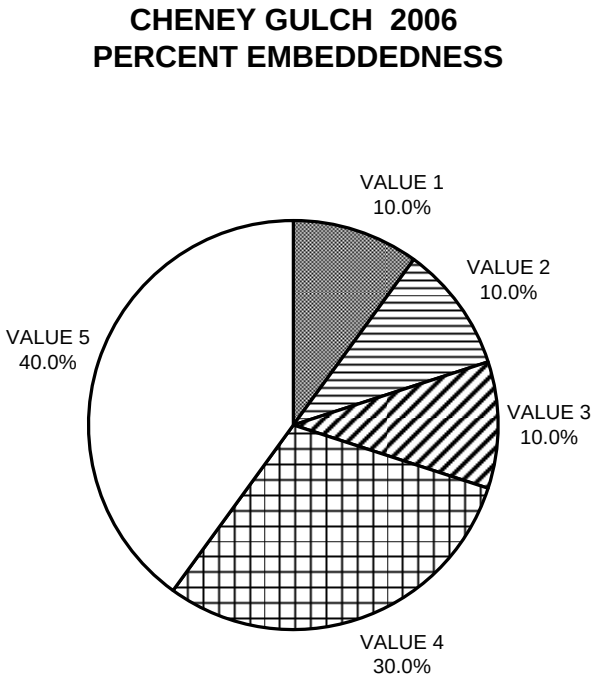


GRAPH 4

Cheney Gulch

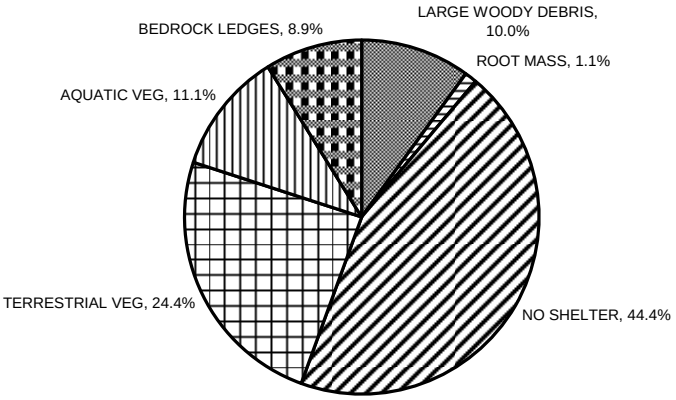


GRAPH 5



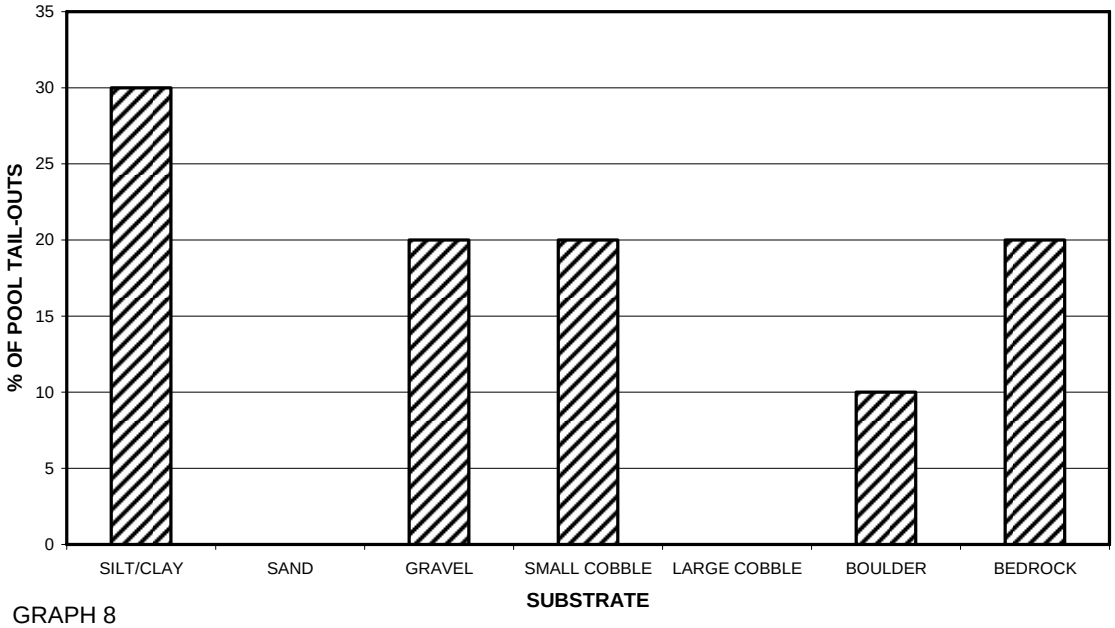
GRAPH 6

CHENEY GULCH 2006
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

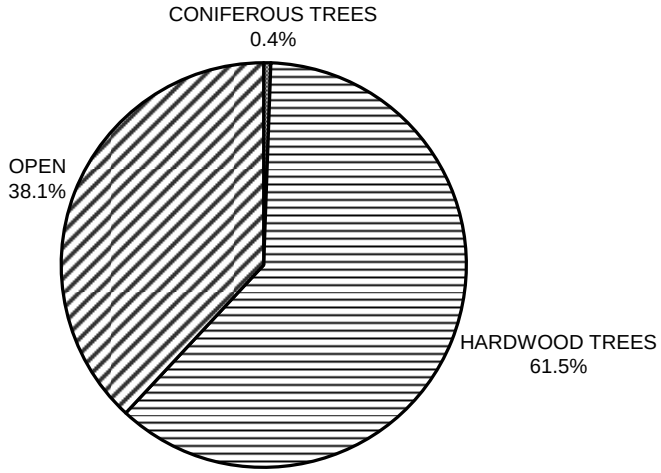
CHENEY GULCH 2006
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



GRAPH 8

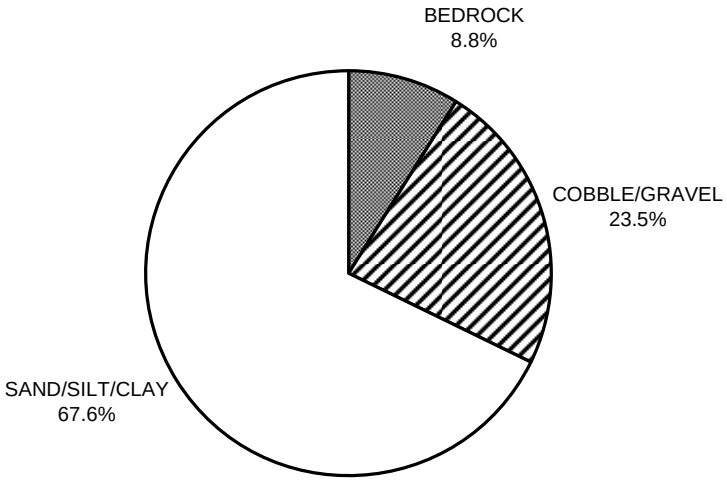
Cheney Gulch

CHENEY GULCH 2006
MEAN PERCENT CANOPY



GRAPH 9

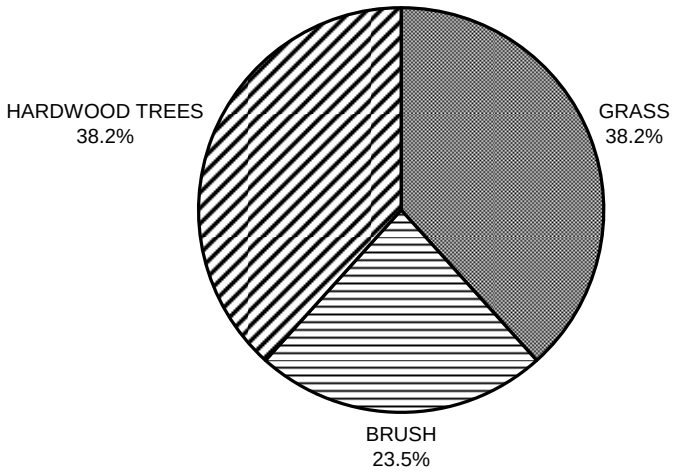
CHENEY GULCH 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

Cheney Gulch

CHENEY GULCH 2006
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11