

# STREAM INVENTORY REPORT

## Manly Gulch

### INTRODUCTION

A stream inventory was conducted on August 31, 2010 on Manly Gulch. The survey began at the confluence with Rocky Gulch and extended upstream 0.4 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Manly Gulch.

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

Manly Gulch is a tributary to Rocky Gulch, tributary to Little North Fork Big River, tributary to Big River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Manly Gulch's legal description at the confluence with Little North Fork Big River is T17N R17W S13. Its location is 39.3339 north latitude and 123.7014 west longitude, LLID number 1236990393349. Manly Gulch is an intermittent stream according to the USGS Mathison Peak 7.5 minute quadrangle. Manly Gulch drains a watershed of approximately 0.54 square miles. Elevations range from about 50 feet at the mouth of the creek to 800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is owned by Jackson Demonstration State Forest (JDSF) and California State Parks and is managed for timber production and recreation. Vehicle access exists via Highway 1 to Caspar Little Lake Road to JDSF and State Parks roads.

### METHODS

The habitat inventory conducted in Manly Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The 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 (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 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

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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 Manly 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". Manly 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 Manly Gulch, embeddedness was

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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 Manly 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 Manly 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 Manly 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

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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.

## **DATA ANALYSIS**

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, 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 Manly 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

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- 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 August 31, 2010, was conducted by A. Glasgow and B. Leonard (WSP). The total length of the stream surveyed was 1,963 feet.

Stream flow was not measured on Manly Gulch.

Manly Gulch is a G4 channel type for 1,963 feet of the stream surveyed. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width /depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 56 degrees Fahrenheit. Air temperatures ranged from 61 to 64 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 45% dry units, 30% pool units, 15% flatwater units, and 10% riffle units (Graph 1). Based on total length of Level II habitat types there were 87% dry units, 6% riffle units, 4% pool units, and 3% flatwater units (Graph 2).

Four Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were dry units, 45%; mid-channel pool units, 30%; and run units 15% (Graph 3). Based on percent total length, dry units made up 87%, low gradient riffle units, 6%; and mid-channel pool units, 4%.

A total of 6 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (Graph 4), and comprised 100% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Two of the 6 pools (33%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 6 pool tail-outs measured, 4 had a value of 4 (66.7%); 2 had a value of 5 (33.3%) (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.

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

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rating of 2 and pool habitats had a mean shelter rating of 40 (Table 1). The main channel pools had a mean shelter rating of 40 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Manly Gulch. Graph 7 describes the pool cover in Manly Gulch. Small woody debris is the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel and sand were the dominant substrate types, each observed in 33% of the pool tail-outs. Boulders were the next most frequently observed dominant substrate type and occurred in 17% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Manly Gulch was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 17% and 83%, respectively. Graph 9 describes the mean percent canopy in Manly Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 88%. The mean percent left bank vegetated was 85%. The dominant elements composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 75% of the units surveyed. Additionally, 19% of the units surveyed had deciduous trees as the dominant vegetation type, and 6% had brush as the dominant vegetation type (Graph 11).

## **DISCUSSION**

Manly Gulch is a G4 channel type for the entire 1,963 feet of stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded during the survey ranged from 54 to 56 degrees Fahrenheit. Air temperatures ranged from 61 to 64 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any 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 3% of the total length of this survey, riffles 6%, and pools 4%. Two of the 6 (33%) pools had 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.

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None of the 6 pool tail-outs measured had embeddedness ratings of 1 or 2. Four of the pool tail-outs had embeddedness ratings of 3 or 4. Two 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 Manly Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Four of the 6 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 is 40. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Manly Gulch. Small woody debris is the dominant cover type in pools followed by large woody debris. 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 95%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 88% and 85%, 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.

## **RECOMMENDATIONS**

- 1) Manly Gulch should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 4) 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.
- 5) Due to limited flow during summer months, Manly Gulch should be redirected back into its original channel and allowed to flow directly into the Little North Fork Big River.

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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 at confluence with Rocky Gulch. The channel is a G4. Manly Gulch has been diverted down Road 730 and enters Rocky Gulch near the confluence with Little North Fork Big River.
99	0006.00	Road 730 is on the left bank. Manly Gulch is dry for the entire unit. The dry channel turns away from Road 730 at 586' and the survey heads toward a cabin on the right bank and into the forest. A walking trail crosses at 1,113'. At 1,196', Manly Gulch is in its original channel. The stream is entrenched with 5' high vertical banks. At 1,400', the channel widens to 16' due to eroding banks.
1963	0020.00	End of survey at a 5.5' high plunge with no pool below it. The plunge is over a wall of clay anchored by a 5' diameter piece of large wood. The channel is mostly dry and the sediment is primarily silt/clay.

### 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.



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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: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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
9	0	DRY	45.0	190	1712	87.2									
3	0	FLATWATER	15.0	23	68	3.5									
6	6	POOL	30.0	12	72	3.7	5.8	0.8	1.7	70	420	56	339	56	40
2	2	RIFFLE	10.0	56	111	5.7	1.5	0.1	0.3	68	135	7	14		3
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
20	8				1963					555			352		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	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 (%)
2	2	LGR	10.0	56	111	5.7	2	0.1	0.3	68	135	7	14		3	98
3	0	RUN	15.0	23	68	3.5										
6	6	MCP	30.0	12	72	3.7	6	0.8	2.5	70	420	56	339	56	40	96
9	0	DRY	45.0	190	1712	87.2										87

Total Units	Total Units Fully Measured
20	8

Total Length (ft.)
1963

Total Area (sq.ft.)
555

Total Volume (cu.ft.)
352

Table 3 - Summary of Pool Types

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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
6	6	MAIN	100	12	72	100	5.8	0.8	70	420	56	339	40

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
6	6	72	420	339

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

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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
6	MCP	100	0	0	4	67	2	33	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
6	0	0	4	67	2	33	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Dry Units: 9

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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
2	2	LGR	30	30	40	0	0	0	0	0	0
2	2	TOTAL RIFFLE	30	30	40	0	0	0	0	0	0
3	0	RUN									
3	0	TOTAL FLAT									
6	6	MCP	4	51	35	4	3	0	0	3	0
6	6	TOTAL POOL	4	51	35	4	3	0	0	3	0
20	8	TOTAL	8	47	36	3	2	0	0	2	0

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Dry Units: 9

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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
2	2	LGR	0	0	100	0	0	0	0
3	0	RUN	0	0	0	0	0	0	0
6	6	MCP	67	0	17	17	0	0	0

**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	83	17	0	88	85

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.



Stream Name: Manly Gulch	LLID: 1236990393349	Drainage: Big River
Survey Dates: 8/31/2010 to 8/31/2010	Survey Length (ft.): 1963	Main Channel (ft.): 1963
		Side Channel (ft.): 0
Confluence Location: Quad: MATHISON PEAK	Legal Description: T17NR17WS13	Latitude: 39:20:06.0N
		Longitude: 123:41:56.0W

<b>STREAM REACH: 1</b>										
Channel Type:	G4					Canopy Density (%):	95.1		Pools by Stream Length (%):	3.7
Reach Length (ft.):	1963					Coniferous Component (%):	83.3		Pool Frequency (%):	30.0
Riffle/Flatwater Mean Width (ft.):	1.5					Hardwood Component (%):	16.7		Residual Pool Depth (%):	
BFW:						Dominant Bank Vegetation:	Coniferous Trees		< 2 Feet Deep:	67
Range (ft.):	5	to	11			Vegetative Cover (%):	86.6		2 to 2.9 Feet Deep:	33
Mean (ft.):	8					Dominant Shelter:	Small Woody Debris		3 to 3.9 Feet Deep:	0
Std. Dev.:	3					Dominant Bank Substrate Type:	Sand/Silt/Clay		>= 4 Feet Deep:	0
Base Flow (cfs.):	0.0					Occurrence of LWD (%):	27		Mean Max Residual Pool Depth (ft.):	1.7
Water (F):	54 - 56	Air (F):	61 - 64			LWD per 100 ft.:			Mean Pool Shelter Rating:	40
Dry Channel (ft):	1712					Riffles:	2			
						Pools:	10			
						Flat:	3			
Pool Tail Substrate (%):	Silt/Clay: 17	Sand: 33	Gravel: 33	Sm Cobble: 0	Lg Cobble: 0	Boulder: 17	Bedrock: 0			
Embeddedness Values (%):	1. 0.0	2. 0.0	3. 0.0	4. 66.7	5. 33.3					

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	8	8	100.0

**Mean Percentage of Dominant Stream Bank Vegetation**

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	0	1	6.3
Hardwood Trees	2	1	18.8
Coniferous Trees	6	6	75.0
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:**

4

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

StreamName: Manly Gulch

LLID: 1236990393349

Drainage: Big River

Survey Dates: 8/31/2010 to 8/31/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

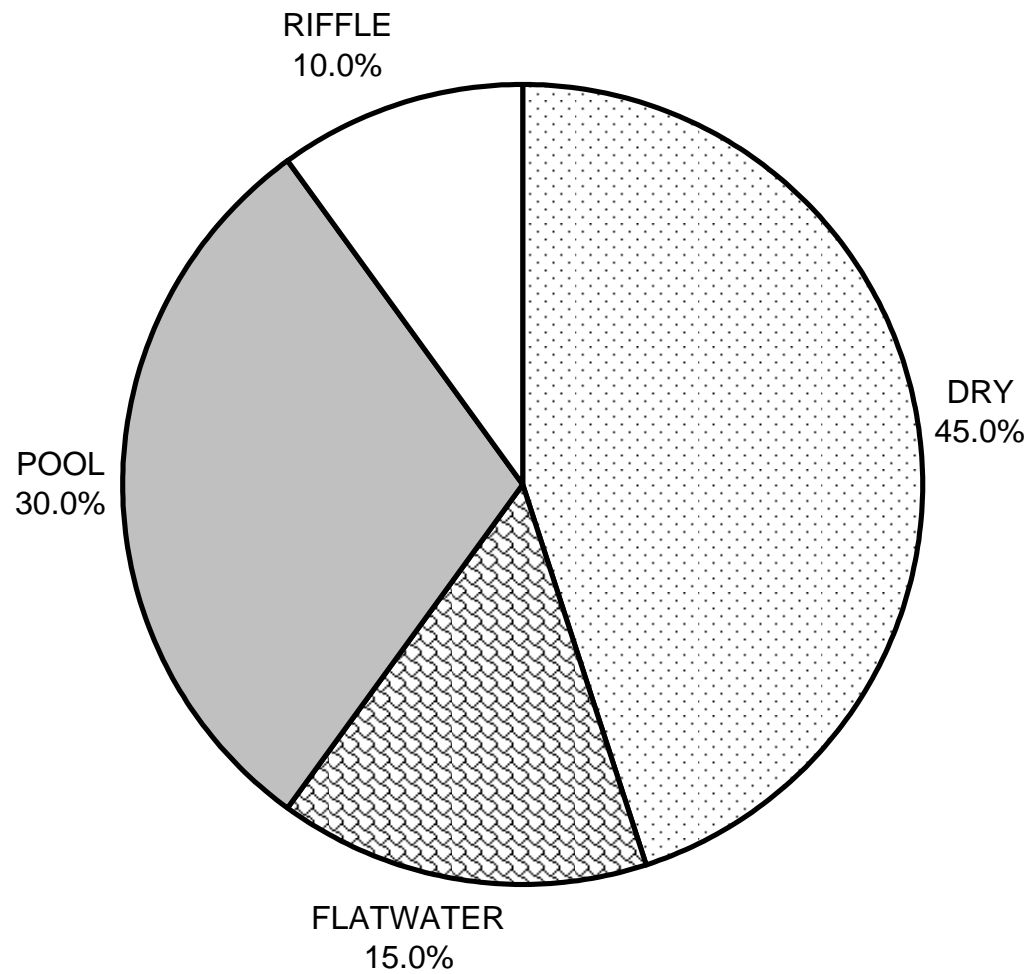
Latitude: 39:20:06.0N

Longitude: 123:41:56.0W

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	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	30		4
SMALL WOODY DEBRIS (%)	30		51
LARGE WOODY DEBRIS (%)	40		35
ROOT MASS (%)	0		4
TERRESTRIAL VEGETATION (%)	0		3
AQUATIC VEGETATION (%)	0		0
WHITEWATER (%)	0		0
BOULDERS (%)	0		3
BEDROCK LEDGES (%)	0		0

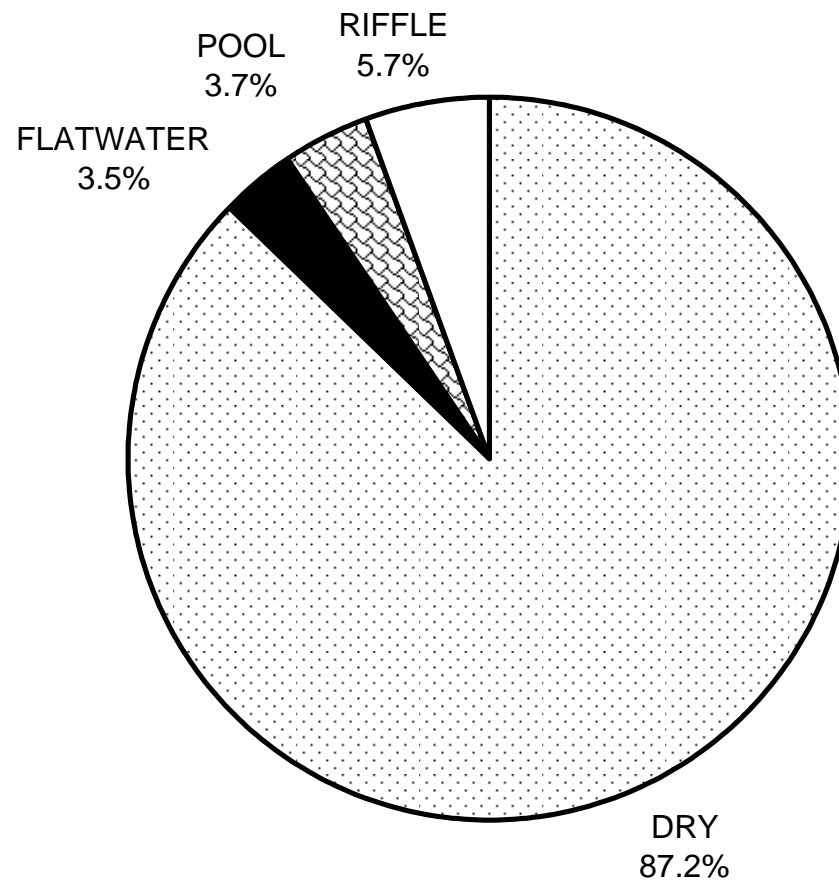
**MANLY GULCH 2010**  
**HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

# MANLY GULCH 2010

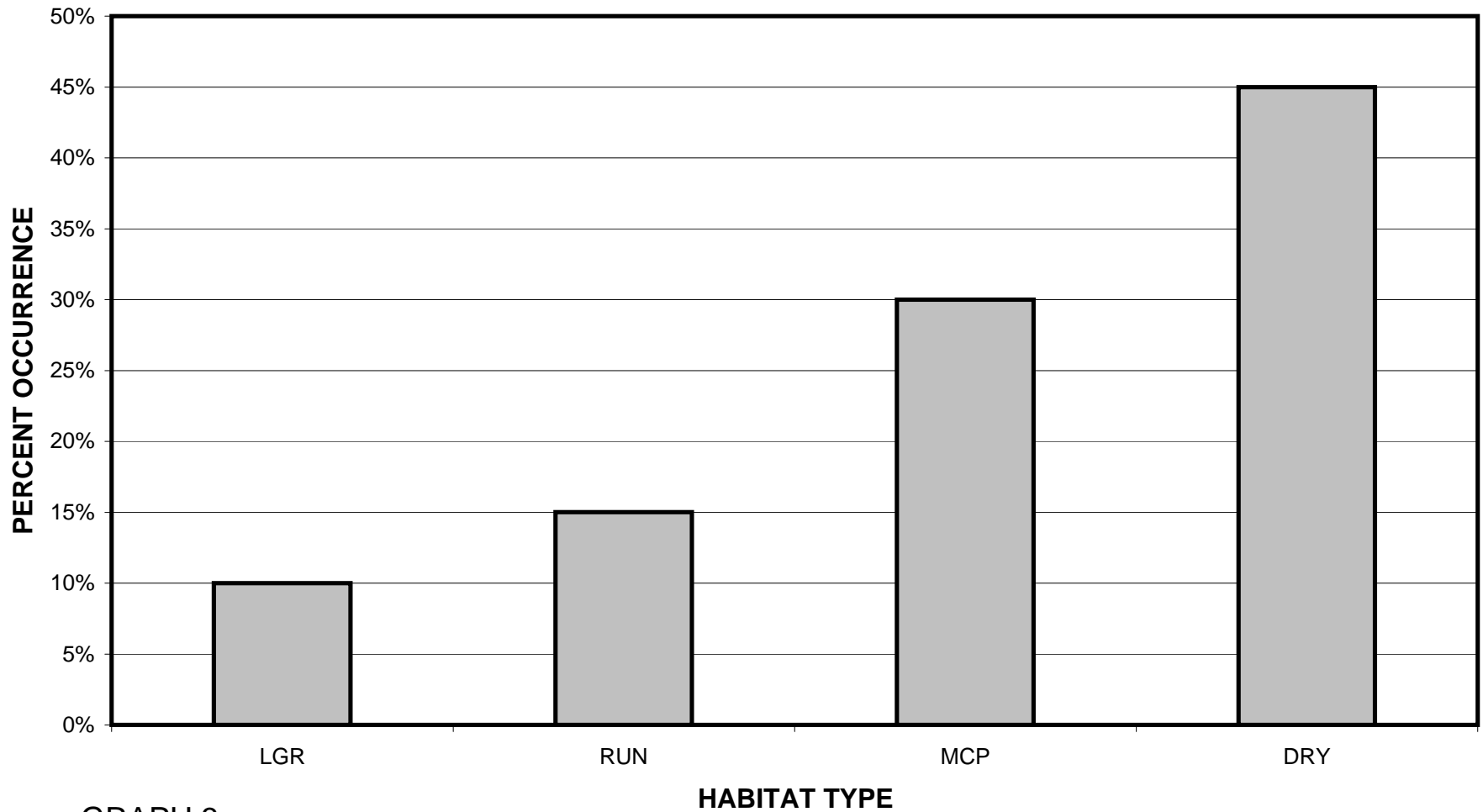
## HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

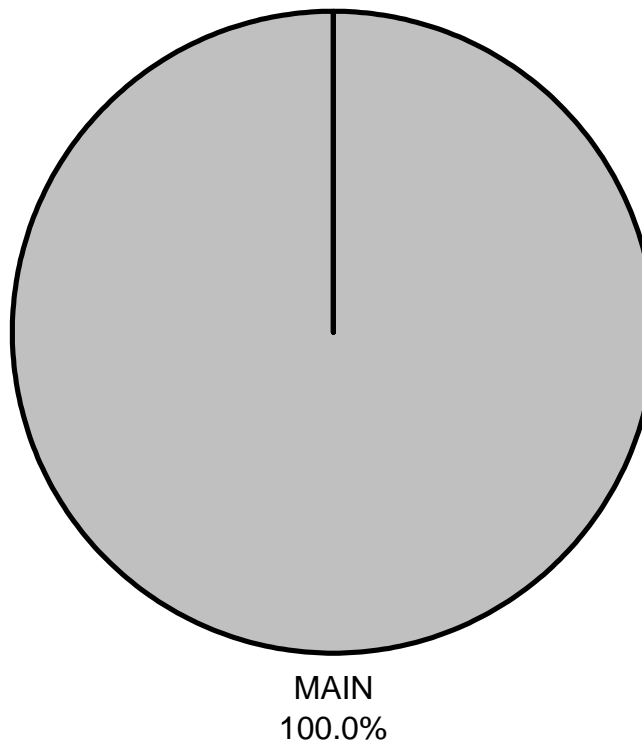
# MANLY GULCH 2010

## HABITAT TYPES BY PERCENT OCCURRENCE



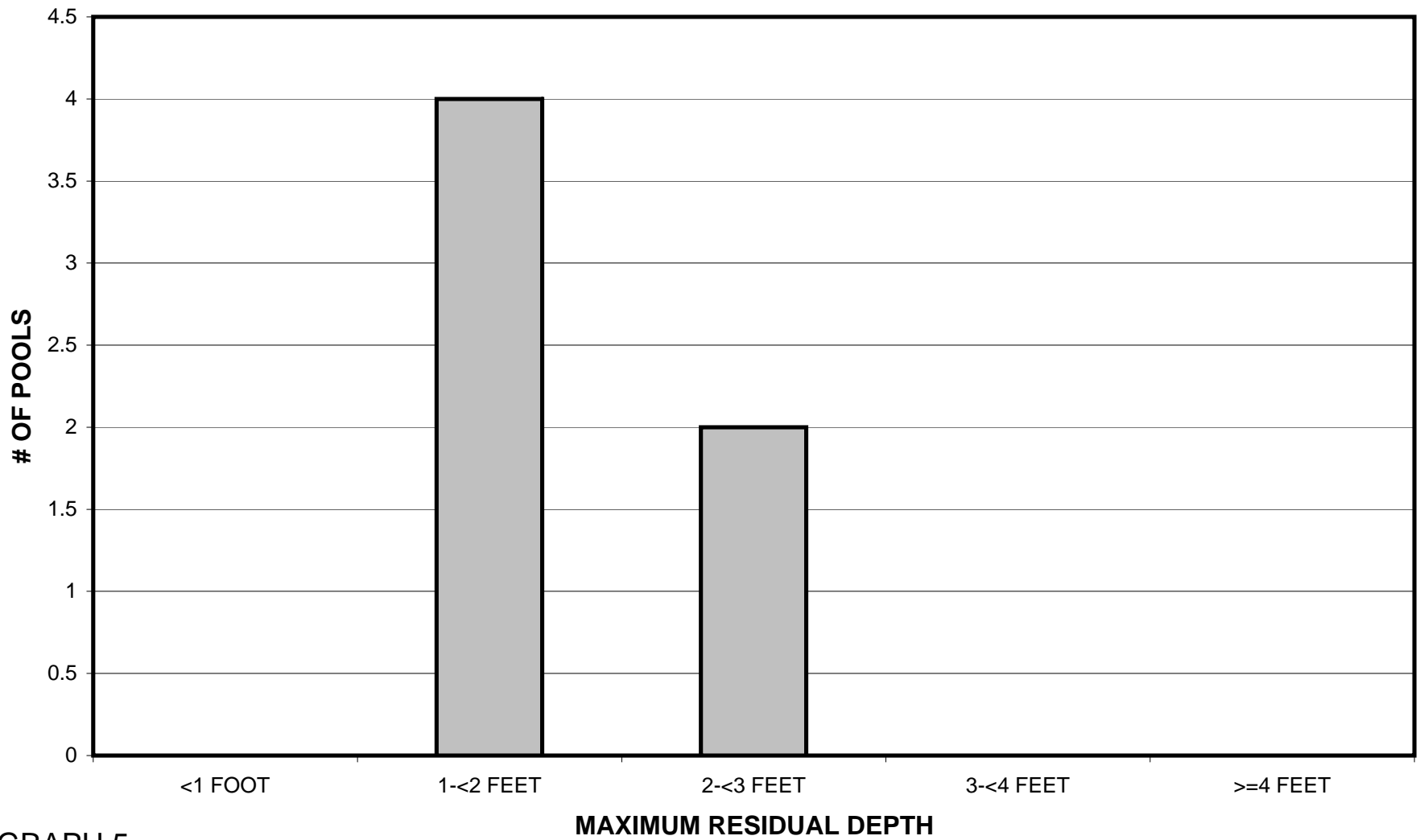
GRAPH 3

**MANLY GULCH 2010**  
**POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

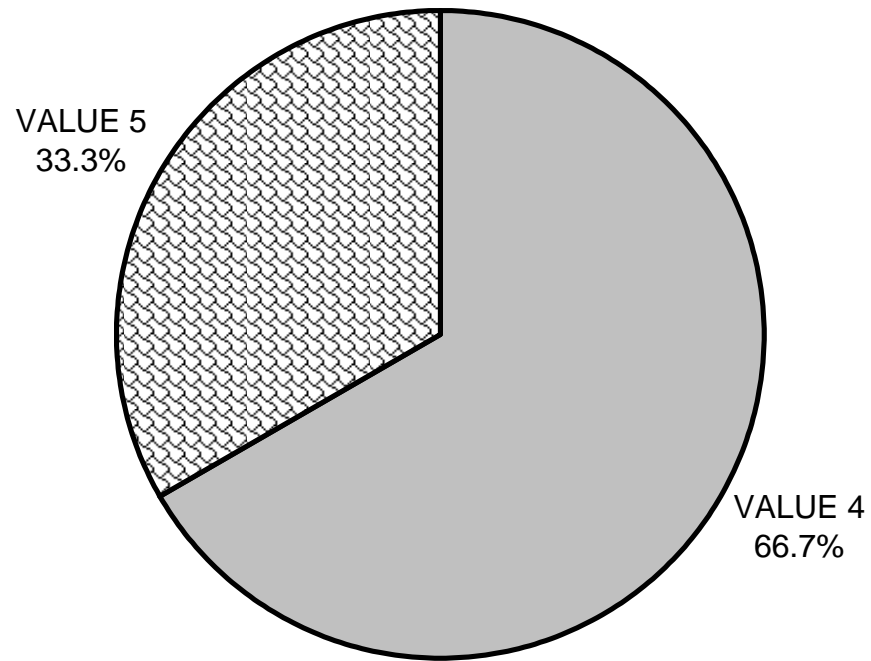
# MANLY GULCH 2010 MAXIMUM DEPTH IN POOLS



GRAPH 5



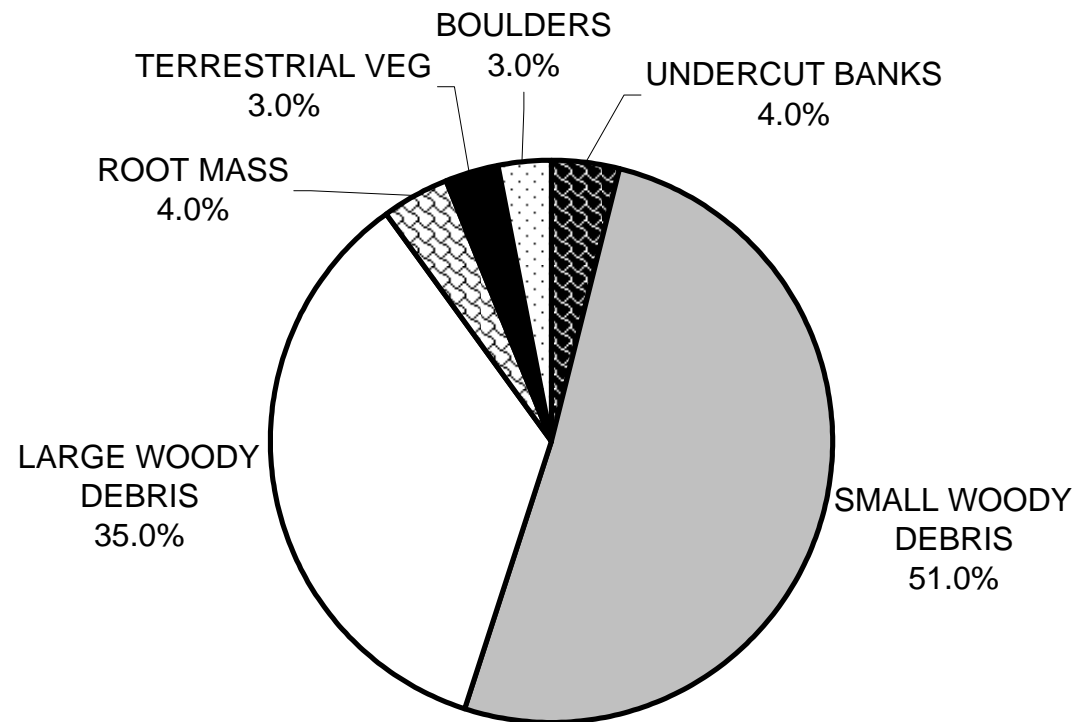
**MANLY GULCH 2010  
PERCENT EMBEDDEDNESS**



GRAPH 6

# MANLY GULCH 2010

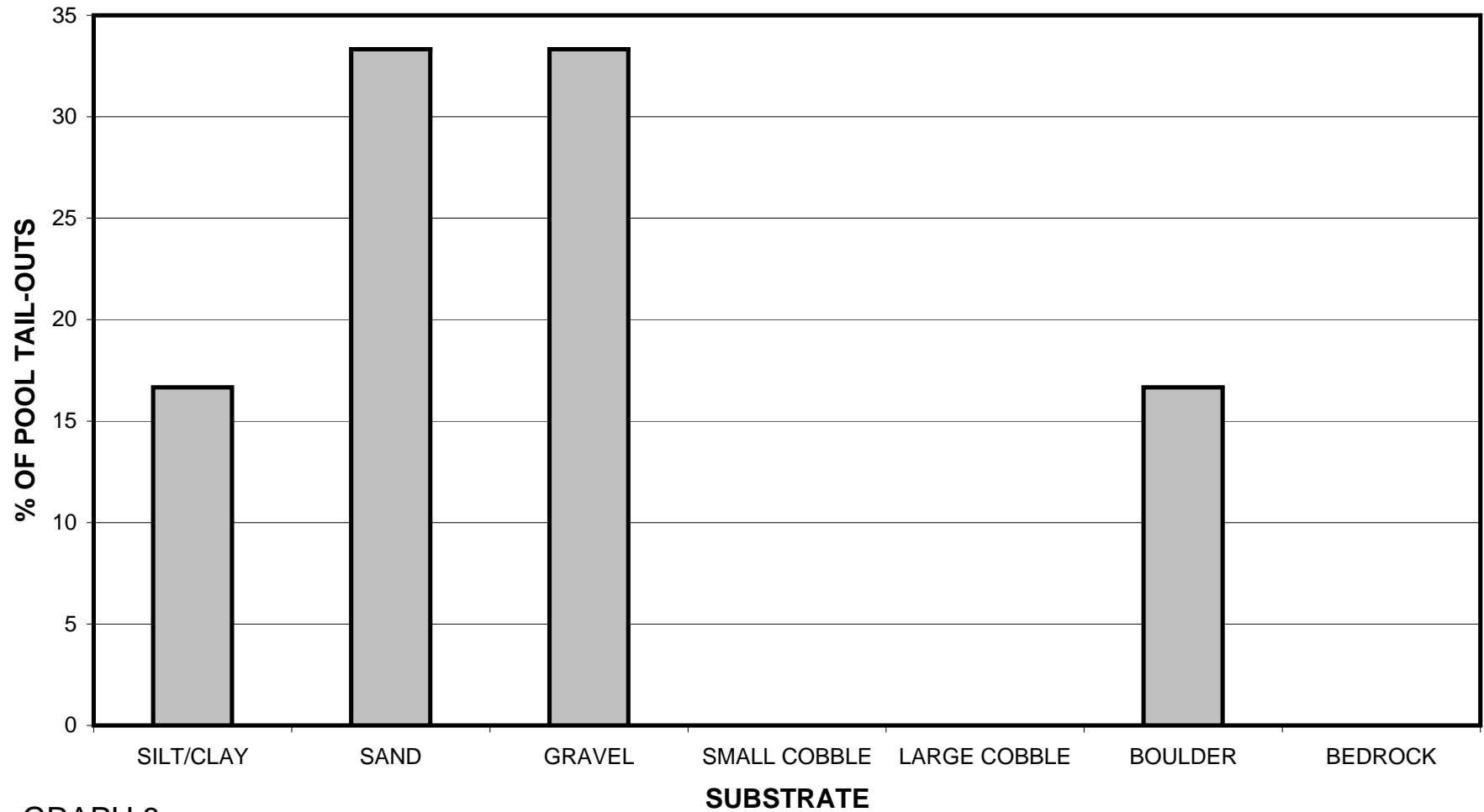
## MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

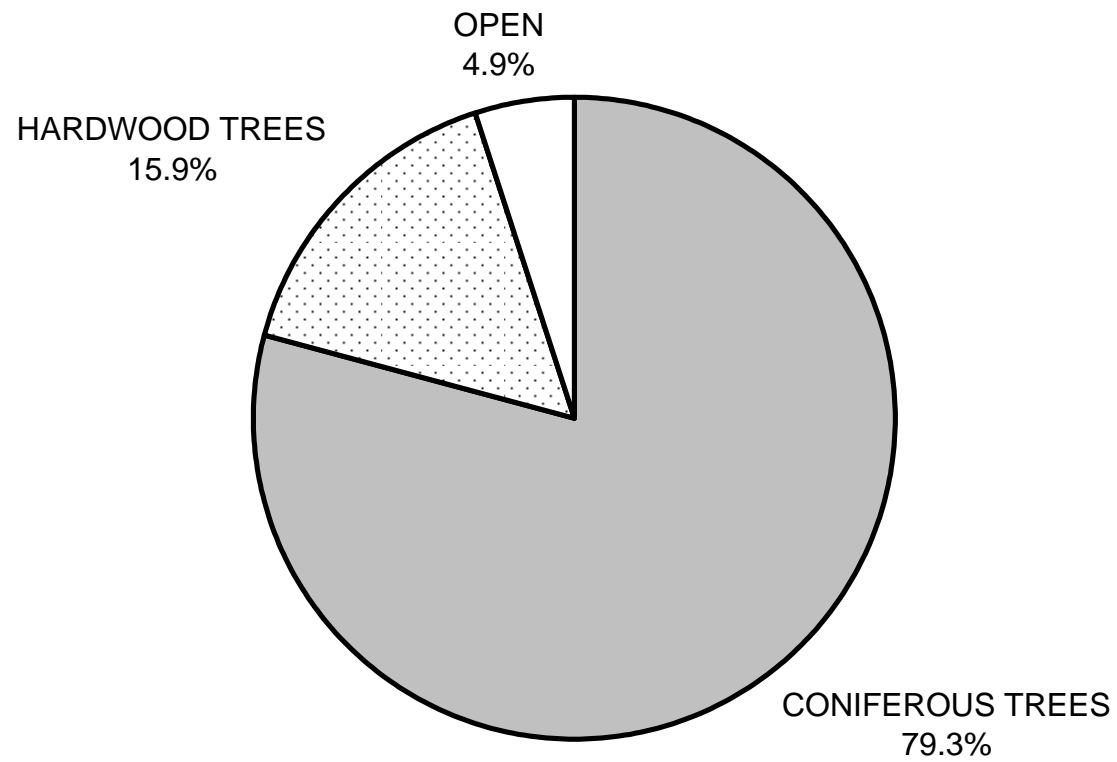
# MANLY GULCH 2010

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



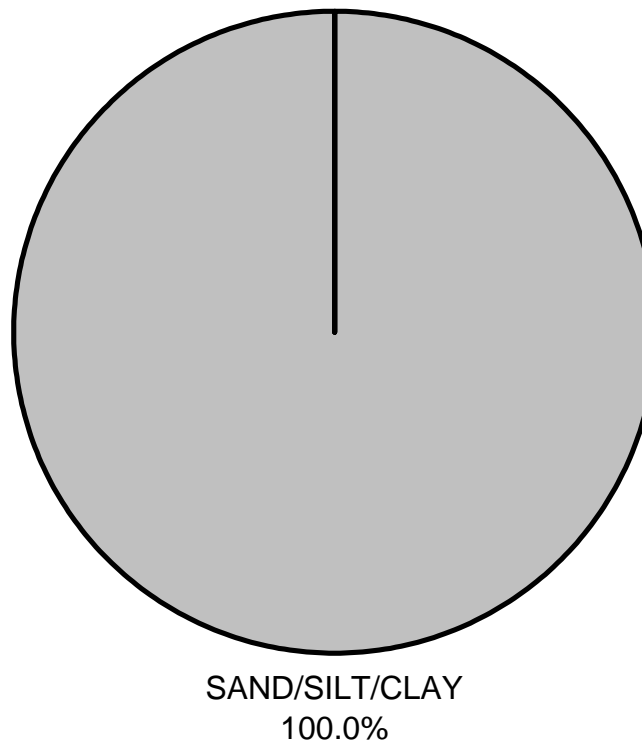
GRAPH 8

**MANLY GULCH 2010  
MEAN PERCENT CANOPY**



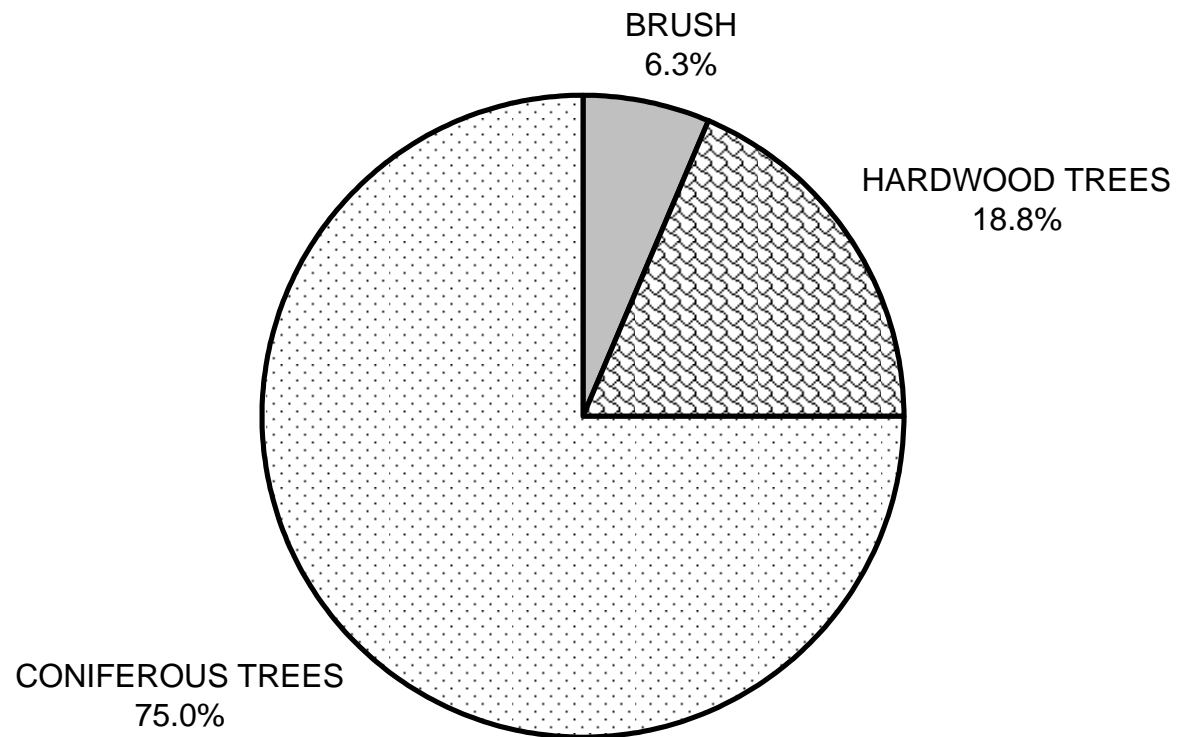
GRAPH 9

**MANLY GULCH 2010**  
**DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**MANLY GULCH 2010**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Map 1  
Manly Gulch  
Big River Watershed  
Mathison Peak Quad, Mendocino County



## Legend

- Reach 1, G4 Channel Type
- Disconnected Stream Segment

0 500 1,000 Feet

Start and end survey points are approximate.

