

STREAM INVENTORY REPORT

“Panther Creek”

INTRODUCTION

A stream inventory was conducted on August 21, 2003 on an unnamed tributary to Alder Creek locally known as, and herein after referred to as, Panther Creek. The survey began at the confluence with Alder Creek and extended upstream 3,096 feet.

The Panther 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 Panther 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 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

Panther Creek is a tributary to Alder Creek, a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Panther Creek's legal description at the confluence with Alder Creek is T13N R15W S21. Its location is 39°58'51" north latitude and 123°31'26" west longitude. Panther Creek is a first order stream and has approximately 6,410 feet of solid blue line stream according to the USGS Eureka Hill 7.5 minute quadrangle. Panther Creek drains a watershed of approximately 0.79 square miles. Elevations range from about 748 feet at the mouth of the creek to 2,238 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Piper Ranch logging roads.

METHODS

The habitat inventory conducted in Panther Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The California Department of Fish and Game field crew and the Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) 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.

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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 Panther Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at 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 (1985 rev. 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 (1988). 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". Panther 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

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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 Panther 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 particle size, bedrock, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide 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. 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 Panther 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.

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 Panther 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 evergreen or deciduous 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 Panther 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

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(including downed trees, logs, and rootwads) was estimated and recorded.

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 Panther Creek. In addition, two sites were electrofished in 2002 by Mendocino Redwood Company, aquatic biologists, using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat 8.4, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following seven tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types
- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

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

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

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HABITAT INVENTORY RESULTS

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

The habitat inventory of August 21, 2003, was conducted by S. Sellars (WSP/Americorps) and J. Crews (DFG). The total length of the stream surveyed was 3,096 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.085 cfs on October 8, 2003.

Panther Creek is an A2 channel type for the entire 3,096 feet of the stream surveyed. A2 channels are steep, narrow, cascading, step-pool streams with high energy/debris transport associated with depositional soils and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 54° to 56 ° Fahrenheit. Air temperatures ranged from 57° to 70° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 37% pool units, 31% riffle units, and 25% flatwater units (Graph 1). Based on total length of Level II habitat types there were 49% riffle units, 37% flatwater units, and 10% pool units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low-gradient riffles, 29%; runs, 15%; and mid-channel pools, 12% (Graph 3). Based on percent total length, low-gradient rifles made up 49%, runs 28%, and step-runs 4%.

A total of 19 pools were identified (Table 3). Scour pools were the most frequently encountered, at 58%, and comprised 51% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Three of the 19 measured pools (16%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 19 pool tail-outs measured, 2 had a value of 1 (11%); 14 had a value of 2 (74%); 3 had a value of 3 (16%); 0 had a value of 4 (0%); and 0 had a value of 5 (0%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Riffle habitat types had a mean shelter rating of 73, flatwater habitat types had a mean shelter rating of 57, and pool habitats had a mean shelter rating of 52 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 63. Main-channel pools had a mean shelter rating of 38 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Panther Creek. Graph 7 describes the pool cover in Panther Creek. Boulders are the

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dominant pool cover types 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 was the dominant substrate observed in 84% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 16%.

The mean percent canopy density for the surveyed length of Panther Creek was 98%. The mean percentages of evergreen and deciduous trees were 91% and 2%, respectively with 7% of the canopy open. Graph 9 describes the mean percent canopy in Panther Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 41%. The mean percent left bank vegetated was 38%. The dominant element composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 94% of the units surveyed. Additionally, 6% of the units surveyed had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A backpack electrofisher survey was conducted at two locations on Panther Creek, by Mendocino Redwood Company, aquatic biologists, on September 24, 2002. All aquatic species were identified, lengths were taken of salmonids. Steelhead rainbow trout (SH) were the only salmonid species observed. Other species identified were, Pacific giant salamanders (PGS), crayfish (CY), and yellow legged frog (YLF) (Table A).

Site 89-21 produced one steelhead trout greater than 130 mm in length.

Site 89-22 produced four steelhead trout below 70 mm and one between 70-130 mm in length.

Table A. Panther Creek biological sampling data.

Date	Site ID	Species	<70 mm	70-130 mm	>130 mm	Other species
9/24/2002	89-21	SH	0	0	1	PGS, CY
9/24/2002	89-22	SH	4	1	0	PGS, YLF

DISCUSSION

Panther Creek is an A2 channel type for the entire 3,096 feet of stream surveyed. A2 channel types are generally not suitable for fish habitat improvement structures due to their high energy, stable stream banks and poor gravel retention capabilities.

The water temperatures recorded during the survey ranged from 54° to 56° Fahrenheit. Air temperatures ranged from 57° to 70° Fahrenheit. Water temperatures were suitable for salmonids. 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.

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Riffle habitat types comprised 49% of the total length of this survey, flatwater 37%, and pools 10%. The pools are relatively shallow, with only 3 of the 19 (16%) measured pools having a maximum 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 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.

Sixteen of the 19 pool tail-outs measured had embeddedness ratings of 1 or 2. Three of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

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

The mean shelter for flatwater was 57. The mean shelter rating for pools was 52. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large woody debris contributes a small amount. 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 93%.

The percentage of right and left bank covered with vegetation was low at 41% and 38%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

- 1) Panther Creek should be managed as an anadromous, natural production stream.
- 2) There are several log debris accumulations present on Panther Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.
- 3) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Fish passage should be monitored and improved where possible.

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- 4) 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.
- 5) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with log and root wad cover is desirable.
- 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.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001	Start of survey at confluence with Alder Creek. Unit 001 not surveyed, within influence of Alder Creek.
352	0012	Left bank erosion.
709	0018	Channel type measured; A2.
1220	0024	Fish observed above large debris accumulation (LDA). Unit not surveyed due to log and root jam retaining gravel.
1343	0027	Fish observed above jam.
1343	0027	LDA retaining gravel.
1368	0028	LDA not surveyed due to log and root jam.
1743	0036	Right bank tributary. LDA.
1915	0037	Left bank tributary.
2759	0048	Right bank tributary.
2983	0051	Not surveyed due to LDA.

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3096 0052 End of survey, class II break, end of anadromy.

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]	

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TABLES AND GRAPHS

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

Stream Name: Panther Creek		Drainage: Point Arena														
Survey Dates: 8/21/2003 to 8/21/2003																
Confluence Location: Quad: EUREKA HILL		Legal Description: T13NR15WS21		Latitude: 38:58:51.0N		Longitude: 123:31:26.0W										
Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Percent 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	3	FLATWATER	25.0	89	1154	37.3	7.3	0.5	1.1	384	4997	214	2786		57	
4	0	NOSURVEY	7.7	24	97	3.1										
19	19	POOL	35.5	17	317	10.2	8.1	0.6	1.4	129	2453	109	2073	83	52	
16	3	RIFFLE	30.8	96	1528	49.4	7.0	0.3	0.5	170	2726	49	789		73	
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)			
52	25				3096						10176.07		5647.41			

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Panther Creek		Drainage: Point Arena														
Survey Dates: 8/21/2003 to 8/21/2003																
Confluence Location: Quad: EUREKA HILL		Legal Description: T13NR15WS21		Latitude: 38:58:51.0N		Longitude: 123:31:26.0W										
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 (%)
15	2	LGR	28.8	101	1519	49.1	8	0.3	0.5	229	3428	69	1028		100	94
1	1	HGR	1.9	9	9	0.3	6	0.2	0.4	54	54	11	11		20	98
2	1	GLD	3.8	62	123	4.0	6	0.5	0.8	174	348	87	174		10	95
8	1	RUN	15.4	110	876	28.3	6	0.5	1.5	316	2530	158	1285		80	94
3	1	SRN	5.8	52	155	5.0	10	0.6	1.1	663	1989	398	1193		80	97
6	6	MCP	11.5	15	89	2.9	7	0.5	1.6	102	612	70	418	48	35	93
2	2	STP	3.8	34	67	2.2	6	0.5	1.6	191	382	130	260	92	45	93
1	1	CRP	1.9	18	18	0.6	6	0.3	1.2	108	108	65	65	32	30	77
4	4	LSL	7.7	15	59	1.9	9	0.4	1.4	131	523	71	285	48	45	96
2	2	LSR	3.8	20	40	1.3	12	1.3	2.8	238	475	349	698	301	135	95
1	1	LSBo	1.9	8	8	0.3	13	1.3	2.2	104	104	156	156	135	60	92
3	3	PLP	5.8	12	36	1.2	7	0.5	2.3	83	250	84	191	50	43	90
4	0	NS	7.7	24	97	3.1										91
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)			
52	25				3096						10801.85		5744.025			

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Table 3 - Summary of Pool Types

Stream Name: Panther Creek

Drainage: Point Arena

Survey Dates: 8/21/2003 to 8/21/2003

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS21

Latitude: 38:58:51.0N

Longitude: 123:31:26.0W

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
8	8	MAIN	42	20	156	49	6.7	0.5	124	994	59	472	38
11	11	SCOUR	58	15	161	51	9.1	0.7	133	1460	101	1114	63

Total Units	Total Units Fully Measured
19	19

Total Length (ft.)
317

Total Area (sq.ft.)
2453

Total Volume (cu.ft.)
1586.05

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

Stream Name: Panther Creek

Drainage: Point Arena

Survey Dates: 8/21/2003 to 8/21/2003

Confluence Location: Quad: EUREKA HILL Legal Description: T13NR15WS21 Latitude: 38:58:51.0N Longitude: 123:31:26.0W

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	32	1	17	5	83	0	0	0	0	0	0
2	STP	11	0	0	2	100	0	0	0	0	0	0
1	CRP	5	0	0	1	100	0	0	0	0	0	0
4	LSL	21	2	50	2	50	0	0	0	0	0	0
2	LSR	11	0	0	1	50	1	50	0	0	0	0
1	LSBo	5	0	0	0	0	1	100	0	0	0	0
3	PLP	16	1	33	1	33	1	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
19	4	21	12	63	3	16	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

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Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Panther Creek		Drainage: Point Arena									
Survey Dates: 8/21/2003 to 8/21/2003		Dry Units: 0									
Confluence Location: Quad: EUREKA HILL		Legal Description: T13NR15WS21									
		Latitude: 38:58:51.0N									
		Longitude: 123:31:26.0W									
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
15	2	LGR	0	0	0	0	0	0	10	90	0
1	1	HGR	0	0	0	0	0	0	60	40	0
16	3	TOTAL RIFFLE	0	0	0	0	0	0	27	73	0
2	1	GLD	0	100	0	0	0	0	0	0	0
8	1	RUN	0	0	0	0	0	0	0	100	0
3	1	SRN	0	0	0	0	0	0	30	70	0
13	3	TOTAL FLAT	0	33	0	0	0	0	10	57	0
6	6	MCP	7	2	15	0	0	0	3	70	3
2	2	STP	40	10	0	0	0	0	18	33	0
1	1	CRP	0	0	0	0	20	0	0	80	0
4	4	LSL	0	4	51	0	3	0	0	43	0
2	2	LSR	0	5	35	35	10	0	0	15	0
1	1	LSBo	0	0	0	0	40	0	0	60	0
3	3	PLP	0	0	43	0	0	0	13	43	0
19	19	TOTAL POOL	6	3	26	4	5	0	5	50	1
4	0	NS									
52	25	TOTAL	5	6	20	3	4	0	8	54	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Panther Creek		Drainage: Point Arena							
Survey Dates: 8/21/2003 to 8/21/2003		Dry Units: 0							
Confluence Location: Quad: EUREKA HILL		Legal Description: T13NR15WS21							
		Latitude: 38:58:51.0N							
		Longitude: 123:31:26.0W							
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
15	2	LGR	0	0	0	50	50	0	0
1	1	HGR	0	0	0	0	0	0	100
2	1	GLD	0	0	100	0	0	0	0
8	1	RUN	0	0	0	0	0	100	0
3	1	SRN	0	0	0	100	0	0	0
6	6	MCP	0	0	100	0	0	0	0
2	2	STP	0	0	100	0	0	0	0
1	1	CRP	0	0	100	0	0	0	0
4	4	LSL	0	0	100	0	0	0	0
2	2	LSR	0	0	100	0	0	0	0
1	1	LSBo	0	0	0	0	100	0	0
3	3	PLP	0	0	67	0	33	0	0

Panther Creek

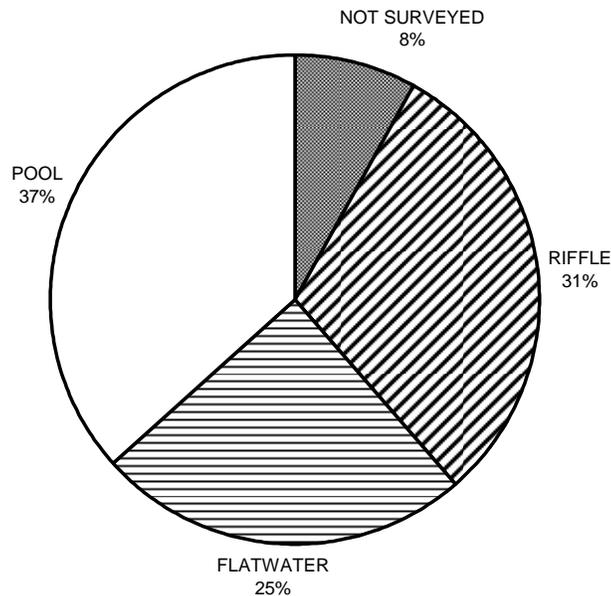
Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Panther Creek Drainage: Point Arena
 Survey Dates: 8/21/2003 to 8/21/2003 Survey Length (ft.): 3096 Main Channel (ft.): 3096 Side Channel (ft.): 0
 Confluence Location: Quad: EUREKA HILL Legal Description: T13NR15WS21 Latitude: 38:58:51.0N Longitude: 123:31:26.0W

Summary of Fish Habitat Elements By Stream Reach

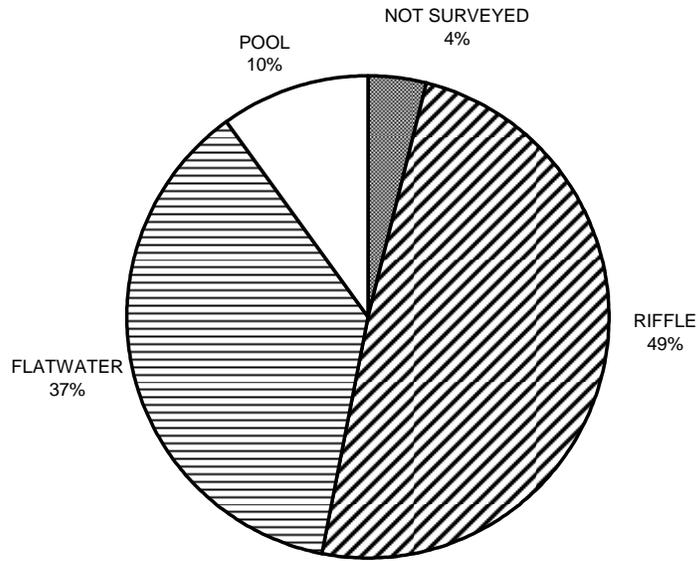
STREAM REACH: 1		
Channel Type: A2	Canopy Density (%): 93	Pools by Stream Length (%): 10
Reach Length (ft.): 3096	Coniferous Component (%): 98	Pool Frequency (%): 37
Riffle/Flatwater Mean Width (ft.): 7.2	Deciduous Component (%): 2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Evergreen Trees	< 2 Feet Deep: 84
Range (ft.): 9 to 12	Vegetative Cover (%): 61	2 to 2.9 Feet Deep: 16
Mean (ft.): 11	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 20	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 54 - 56 Air (F): 57 - 70	LWD per 100 ft.:	Mean Pool Shelter Rating: 52
Dry Channel (ft): 0	Riffles: 2	
	Pools: 8	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 84 Sm Cobble: 16 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 11 2. 74 3. 16 4. 0 5. 0		

PANTHER CREEK HABITAT TYPES BY PERCENT OCCURRENCE



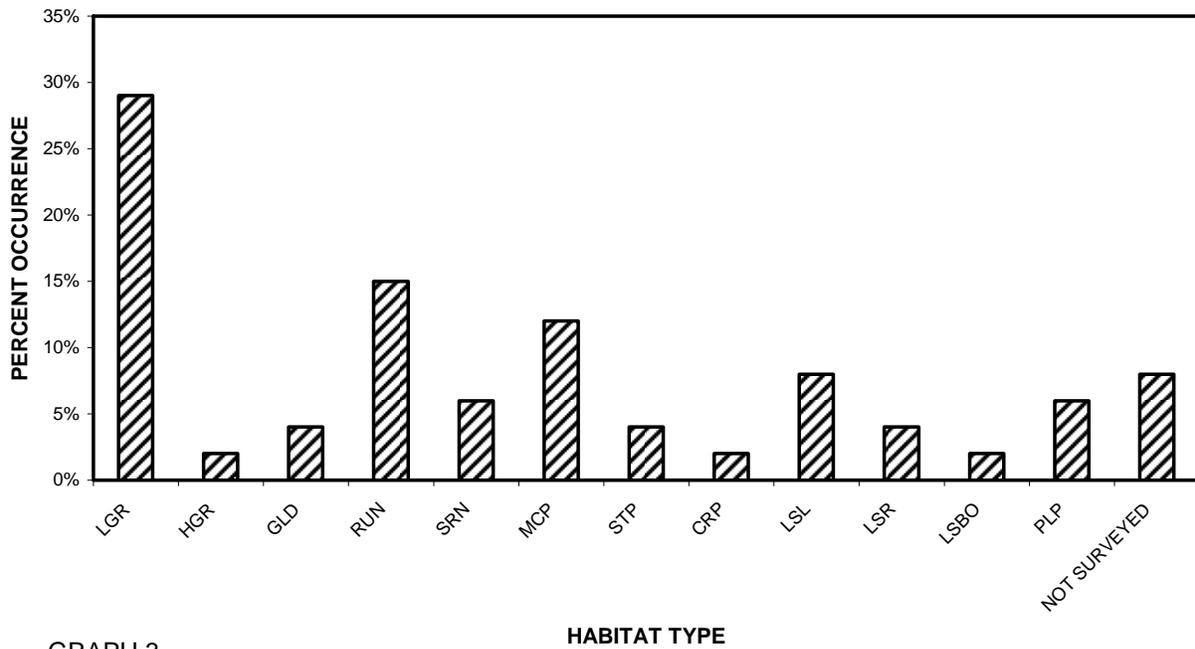
GRAPH 1

PANTHER CREEK HABITAT TYPES BY PERCENT TOTAL LENGTH



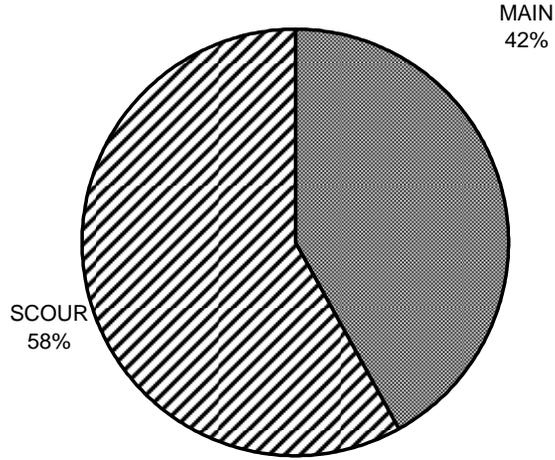
GRAPH 2

PANTHER CREEK HABITAT UNIT TYPES BY PERCENT OCCURRENCE



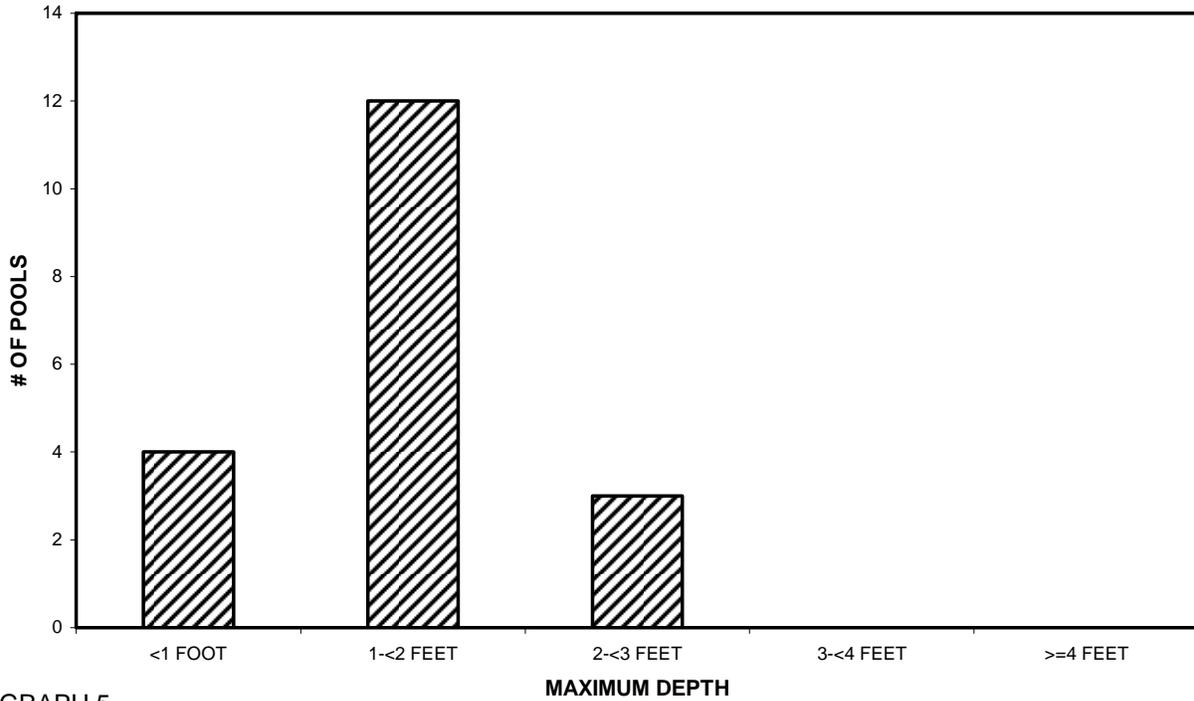
GRAPH 3

PANTHER CREEK POOL HABITAT TYPES BY PERCENT OCCURRENCE



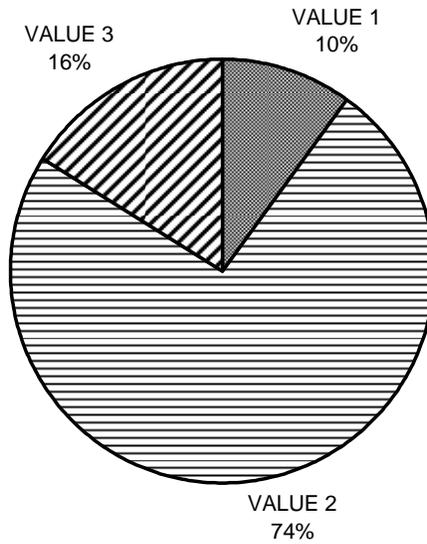
GRAPH 4

PANTHER CREEK MAXIMUM DEPTH IN POOLS



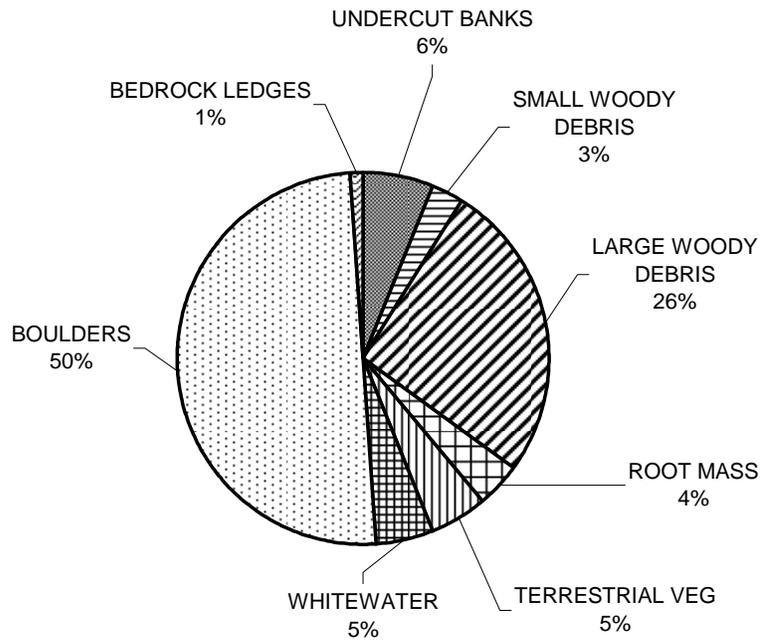
GRAPH 5

PANTHER CREEK PERCENT EMBEDDEDNESS



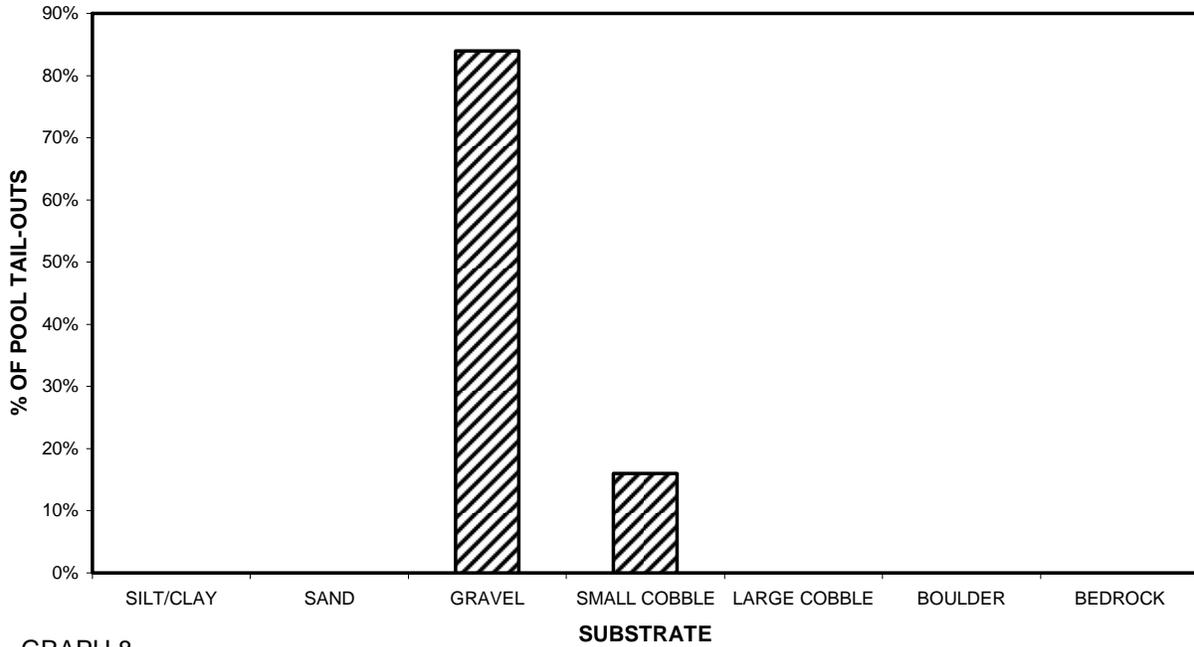
GRAPH 6

PANTHER CREEK MEAN PERCENT COVER TYPES IN POOLS



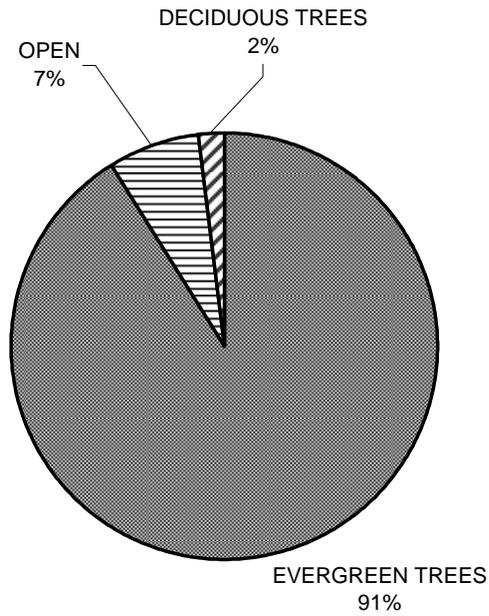
GRAPH 7

PANTHER CREEK SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



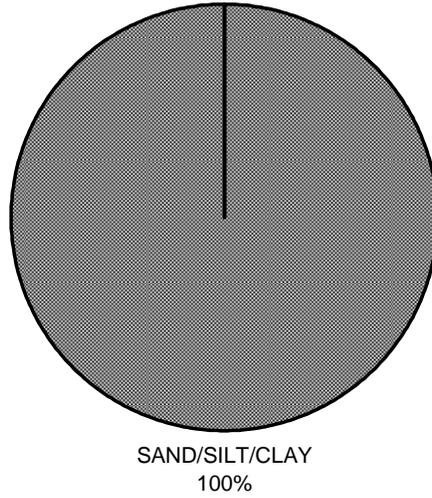
GRAPH 8

PANTHER CREEK MEAN PERCENT CANOPY



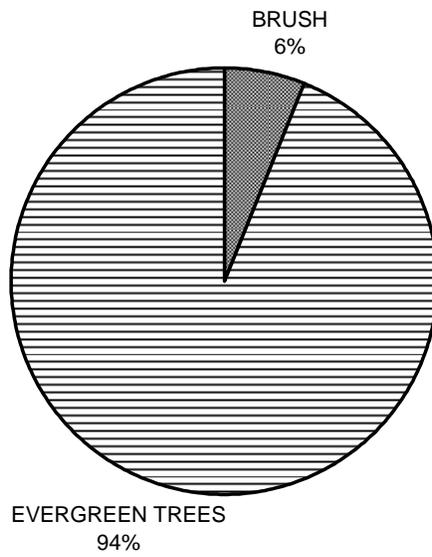
GRAPH 9

PANTHER CREEK DOMINANT BANK COMPOSITION IN SURVEY REACH



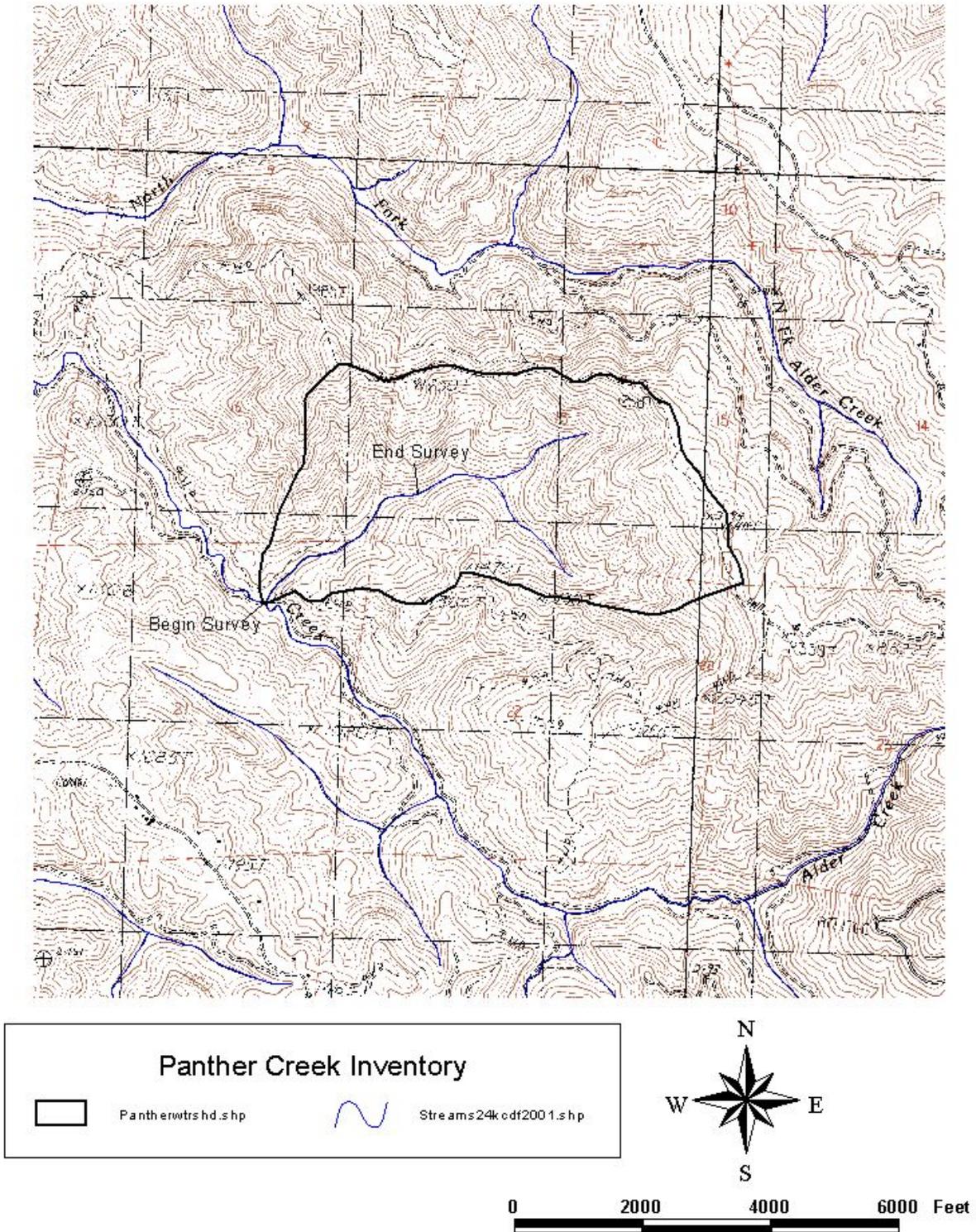
GRAPH 10

PANTHER CREEK DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Panther Creek



MAP 1. Map of Panther Creek showing the stream habitat inventory reach and watershed boundary.