

STREAM INVENTORY REPORT

Doyle Creek

INTRODUCTION

A stream inventory was conducted July 15, 2008 on Doyle Creek. The survey began at the confluence with Pacific Ocean and extended upstream 0.4 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Doyle Creek.

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

Doyle Creek is a tributary to Pacific Ocean, located in Mendocino County, California. Doyle Creek's legal description at the confluence with Pacific Ocean is T17N R18W S01. Its location is 39.3603 north latitude and 123.8187 west longitude, LLID number 1238176393605. Doyle Creek is a first order stream and has approximately 3.2 miles of blue line stream according to the USGS Mendocino 7.5 minute quadrangle. Doyle Creek drains a watershed of approximately 0.8 square miles. Elevations range from sea level at the mouth of the creek to 440 feet in the headwater areas. A mixed hardwood forest dominates the watershed. The watershed is privately owned and is managed for recreation. Vehicle access exists via Point Cabrillo drive off of Highway 1.

METHODS

The habitat inventory conducted in Doyle Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians 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 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 Doyle Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

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

2. Channel Type:

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

3. Temperatures:

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

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Doyle Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Doyle Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

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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 Doyle Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

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

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Doyle Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

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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 2.0.19, 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 Doyle Creek include:

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

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HABITAT INVENTORY RESULTS

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

The habitat inventory of July 15, 2008 was conducted by D. Wright and W. Holloway (PSMC). The total length of the stream surveyed was 2,345 feet. A section from the Pacific Ocean upstream approximately 399 feet was not surveyed due to the influence of the Pacific Ocean. The data in this report is from the 1,946 feet actually surveyed.

Stream flow was not measured on Doyle Creek.

Doyle Creek is an unknown channel type for the first 399 feet of stream (Reach 1), and an F5 channel type for the remaining 1,946 feet of the stream surveyed (Reach 2). F5 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and sand-dominant substrates.

Water temperatures taken during the survey period ranged from 57 to 60 degrees Fahrenheit. Air temperatures ranged from 66 to 68 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 45% pool units, 39% flatwater units and 16% riffle units (Graph 1). Based on total length of Level II habitat types there were 54% flatwater units, 39% pool units and 7% riffle units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 32%; run units, 21%; and step run units, 18% (Graph 3). Based on percent total length, mid-channel pool units made up 30%, step run units 30% and run units 24%.

A total of 17 pools were identified (Table 3). Main channel pools were the most frequently encountered at 71% (Graph 4), and comprised 77% 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. Six of the 17 pools (35%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 17 pool tail-outs measured, 1 had a value of 2 (5.9%); 11 had a value of 3 (64.7%); 2 had a value of 4 (11.8%); 3 had a value of 5 (17.6%) (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 rating of 67, flatwater habitat types had a mean shelter rating of 62, and pool habitats had a mean

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shelter rating of 90 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 94. Main channel pools had a mean shelter rating of 88 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation is the dominant cover type in Doyle Creek. Graph 7 describes the pool cover in Doyle Creek. Terrestrial vegetation 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 was the dominant substrate observed in 65% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 18% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Doyle Creek was 78%. Twenty-two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 87% and 13%, respectively. Graph 9 describes the mean percent canopy in Doyle Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 79%. The mean percent left bank vegetated was 88%. The dominant elements composing the structure of the stream banks consisted of 87% sand/silt/clay, 10% cobble/gravel, 2% bedrock and 2% boulder (Graph 10). Brush was the dominant vegetation type observed in 73% of the units surveyed. Additionally, 21% of the units surveyed had grass as the dominant vegetation type, and 6% had deciduous trees as the dominant vegetation (Graph 11).

DISCUSSION

Doyle Creek is an unknown channel type for the first 399 feet of stream (Reach 1) and an F5 channel type for the remaining 1,946 feet of the stream surveyed (Reach 2). The suitability of F5 channel types for fish habitat improvement structures is as follows: F5 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey day July 15, 2008, ranged from 57 to 60 degrees Fahrenheit. Air temperatures ranged from 66 to 68 degrees Fahrenheit. 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 54% of the total length of this survey, riffles 7%, and pools 39%. Six of the 17 (35%) 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 not warranted.

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One of the 17 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirteen of the pool tail-outs had embeddedness ratings of 3 or 4. Three 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 Doyle Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fourteen of the 17 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 90. The shelter rating in the flatwater habitats was 62. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by terrestrial vegetation in Doyle Creek. Terrestrial vegetation 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 78%. Reach 2 had a canopy density of 78%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 79% and 88%, 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) Doyle Creek 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) 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.

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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	The survey began at the Pacific Ocean. The first 399 feet of stream was not surveyed due to the influence of the Pacific Ocean
400	0002	Begin full sampling of habitat.
483	0005	The stream is very turbid.
524	0006	There is a road crossing and a foot bridge over the stream.
733	0008	The right bank consists of a parking lot.
1009	0014	The right and left banks are heavily embedded with sediment.
1193	0019	There is a right bank failure.
1238	0020	There are large pieces of concrete along the right bank.
1405	0022	There is a small log debris accumulation with no sediment retention.
1799	0031	Foot bridge crossing over the creek.
1837	0032	The right bank consists of collapsed concrete pieces. No salmonids have been observed since the survey began.
2090	0037	Tributary on the left bank of the creek. The tributary is very shallow and inaccessible to fish.
2116	0038	Road crossing over the creek. The right bank consists of sediment and a metal fence.
2345	0039	The survey was ended at the Highway 1 culvert due to lack of landowner permission above. The creek has significant solid waste present. There are structures such as pipes, wires and concrete in the creek. There is significant fine sediment accumulated. No salmonids were observed from the stream banks.

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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: Doyle Creek

LLID: 1238176393605 Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO Legal Description: T17NR18WS01 Latitude: 39:21:38.0N Longitude: 123:49:03.0

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
15	6	FLATWATER	39.5	70	1055	54.2	7.5	0.7	1.4	284	4265	172	2578		62
1	0	NOSURVEY		399	399										
17	17	POOL	44.7	45	758	39.0	10.1	1.2	1.7	422	7166	580	9865	488	90
6	3	RIFFLE	15.8	22	133	6.8	4.0	0.2	0.3	64	385	11	64		67
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
39	26				2345					11816			12506		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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 (%)
6	3	LGR	15.8	22	133	6.8	4	0.2	0.4	64	385	11	64		67	89
8	3	RUN	21.1	59	474	24.4	7	0.8	2.1	205	1637	162	1295		43	70
7	3	SRN	18.4	83	581	29.9	8	0.5	1.5	364	2548	182	1273		80	85
12	12	MCP	31.6	48	581	29.9	10	1.1	2.1	468	5615	640	7678	536	88	75
1	1	CRP	2.6	34	34	1.7	6	1.6	2	204	204	367	367	326	20	98
2	2	LSL	5.3	49	98	5.0	9	1.2	2.3	418	836	629	1257	527	165	70
2	2	LSR	5.3	22	45	2.3	12	1.0	1.6	256	511	281	562	243	60	78
1	0	NS		399	399											

Total Units
39

Total Units Fully Measured
26

Total Length (ft.)
2345

Total Area (sq.ft.)
11736

Total Volume (cu.ft.)
12496

Table 3 - Summary of Pool Types

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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
12	12	MAIN	71	48	581	77	10.3	1.1	468	5615	536	6429	88
5	5	SCOUR	29	35	177	23	9.6	1.2	310	1551	373	1866	94

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
17	17	758	7166	8295

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

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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
12	MCP	71	0	0	8	67	4	33	0	0	0	0
1	CRP	6	0	0	0	0	1	100	0	0	0	0
2	LSL	12	0	0	1	50	1	50	0	0	0	0
2	LSR	12	0	0	2	100	0	0	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
17	0	0	11	65	6	35	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Dry Units: 0

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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
6	3	LGR	0	0	0	0	93	7	0	0	0
6	3	TOTAL RIFFLE	0	0	0	0	93	7	0	0	0
8	3	RUN	0	0	0	0	100	0	0	0	0
7	3	SRN	7	10	10	13	60	0	0	0	0
15	6	TOTAL FLAT	3	5	5	7	80	0	0	0	0
12	12	MCP	8	3	2	0	88	0	0	0	0
1	1	CRP	60	0	0	0	40	0	0	0	0
2	2	LSL	0	40	20	0	40	0	0	0	0
2	2	LSR	0	0	50	10	40	0	0	0	0
17	17	TOTAL POOL	9	6	9	1	74	0	0	0	0
1	0	NS									
39	26	TOTAL	7	5	7	2	77	1	0	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Dry Units: 0

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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
6	3	LGR	33	33	33	0	0	0	0
8	3	RUN	33	33	33	0	0	0	0
7	3	SRN	0	0	67	0	33	0	0
12	12	MCP	8	25	58	0	0	8	0
1	1	CRP	0	0	100	0	0	0	0
2	2	LSL	0	50	50	0	0	0	0
2	2	LSR	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
78	13	87	3	79	88

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: Doyle Creek LLID: 1238176393605 Drainage: Big River
 Survey Dates: 7/15/2008 to 7/15/2008 Survey Length (ft.): 2345 Main Channel (ft.): 2345 Side Channel (ft.): 0
 Confluence Location: Quad: MENDOCINO Legal Description: T17NR18WS01 Latitude: 39:21:38.0N Longitude: 123:49:03.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 399	Coniferous Component (%):	Pool Frequency (%): 0.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%):	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation:	< 2 Feet Deep:
Range (ft.): to	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.):	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.:	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.):	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 60 - 60 Air (F): 67 - 67	LWD per 100 ft.:	Mean Pool Shelter Rating:
Dry Channel (ft): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:		
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0		

STREAM REACH: 2

Channel Type: F5	Canopy Density (%): 78.1	Pools by Stream Length (%): 39.0
Reach Length (ft.): 1946	Coniferous Component (%): 14.0	Pool Frequency (%): 44.7
Riffle/Flatwater Mean Width (ft.): 6.3	Hardwood Component (%): 86.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 65
Range (ft.): 9 to 10	Vegetative Cover (%): 83.6	2 to 2.9 Feet Deep: 35
Mean (ft.): 10	Dominant Shelter: Terrestrial Veg.	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.):	Occurrence of LWD (%): 7	Mean Max Residual Pool Depth (ft.): 1.7
Water (F): 57 - 60 Air (F): 66 - 68	LWD per 100 ft.:	Mean Pool Shelter Rating: 90
Dry Channel (ft): 0	Riffles: 8	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 6 Sand: 12 Gravel: 65 Sm Cobble: 18 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 5.9 3. 64.7 4. 11.8 5. 17.6		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

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	1	0	1.9
Boulder	1	0	1.9
Cobble / Gravel	3	2	9.6
Sand / Silt / Clay	21	24	86.5

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	6	5	21.2
Brush	18	20	73.1
Hardwood Trees	2	1	5.8
Coniferous Trees	0	0	0.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: Doyle Creek

LLID: 1238176393605

Drainage: Big River

Survey Dates: 7/15/2008 to 7/15/2008

Confluence Location: Quad: MENDOCINO

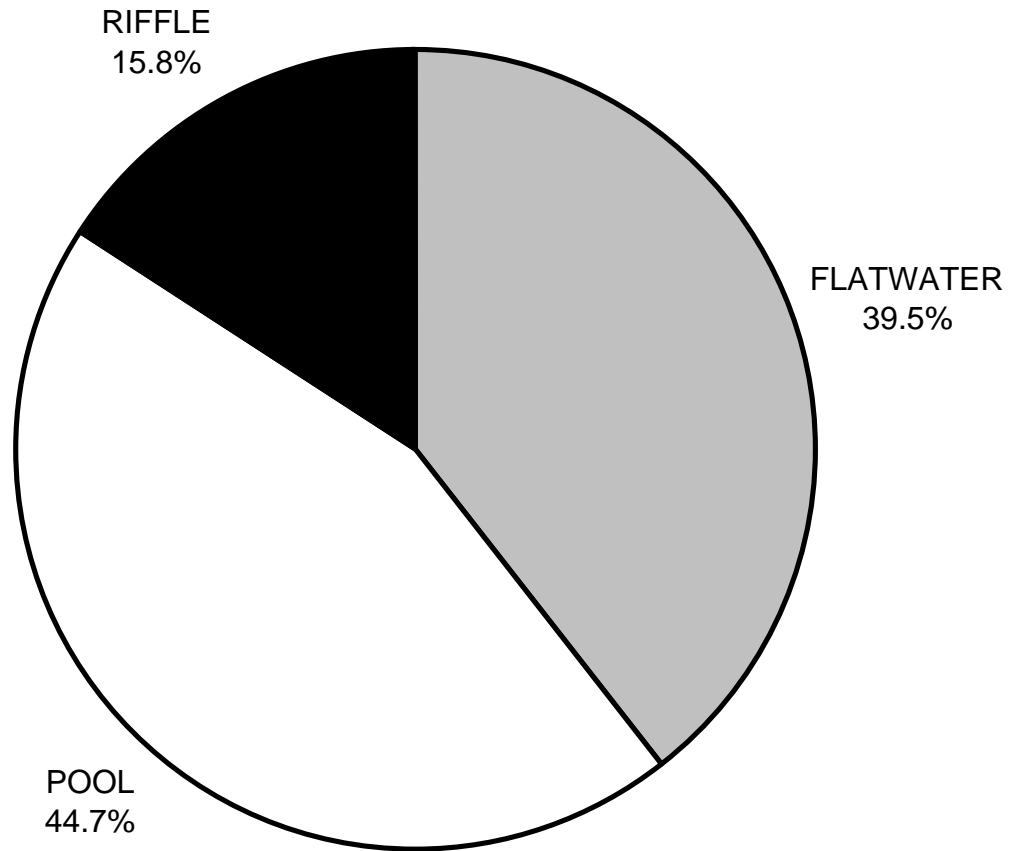
Legal Description: T17NR18WS01

Latitude: 39:21:38.0N

Longitude: 123:49:03.0W

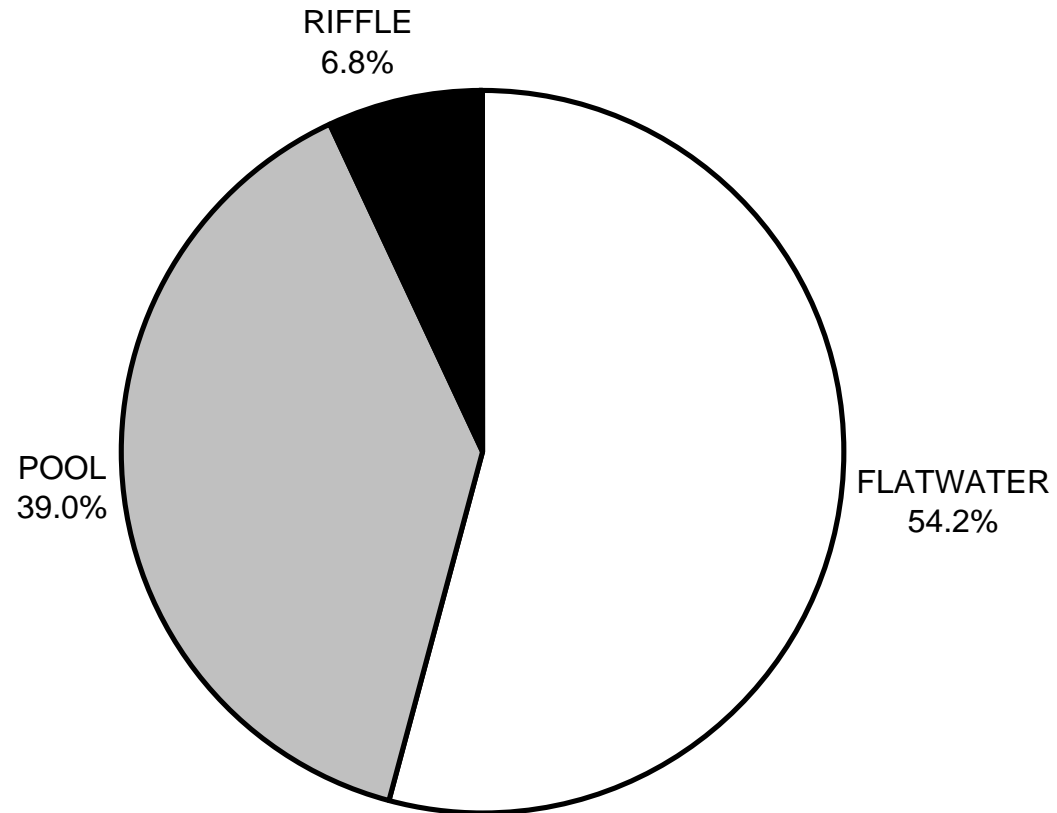
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	3	9
SMALL WOODY DEBRIS (%)	0	5	6
LARGE WOODY DEBRIS (%)	0	5	9
ROOT MASS (%)	0	7	1
TERRESTRIAL VEGETATION (%)	93	80	74
AQUATIC VEGETATION (%)	7	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

**DOYLE CREEK 2008
HABITAT TYPES BY PERCENT OCCURRENCE**



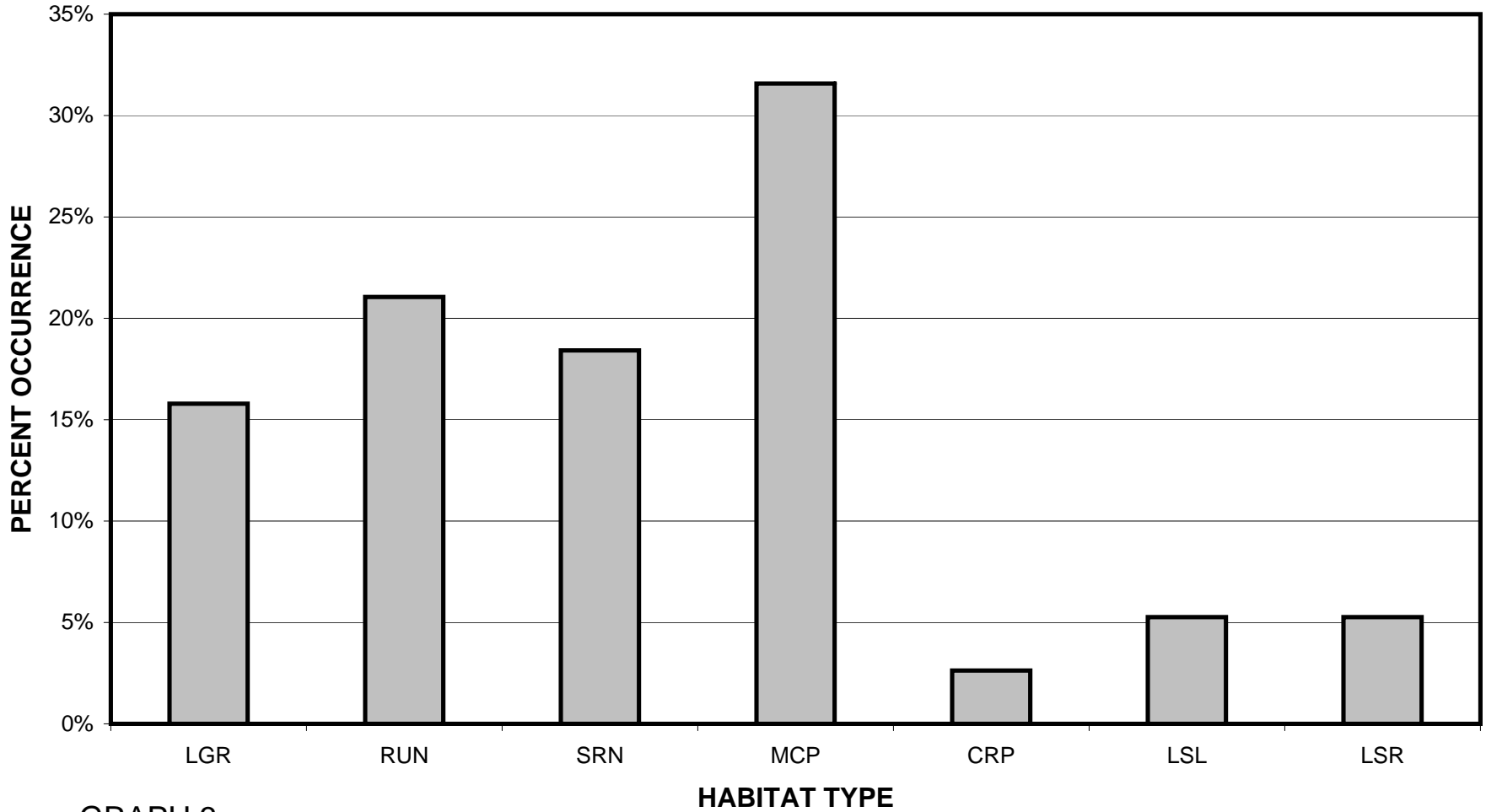
GRAPH 1

**DOYLE CREEK 2008
HABITAT TYPES BY PERCENT TOTAL LENGTH**



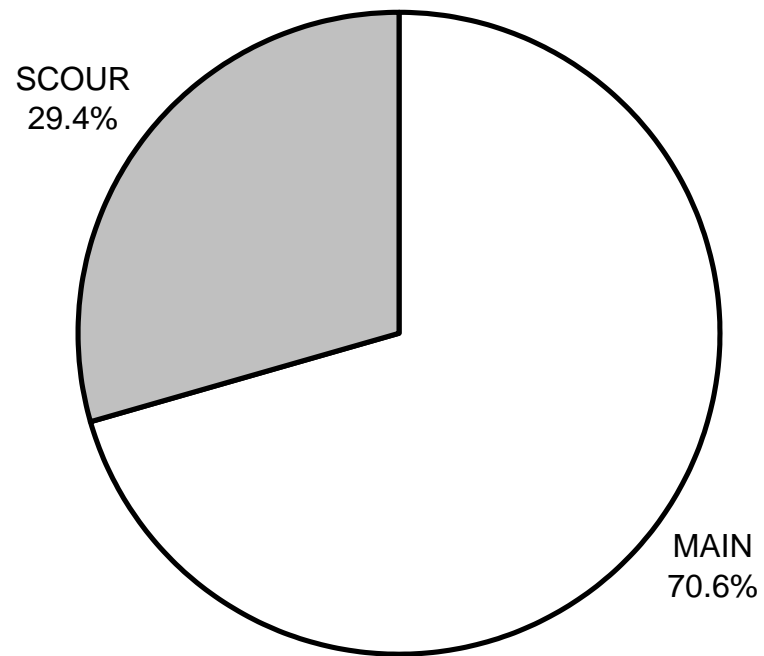
GRAPH 2

DOYLE CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



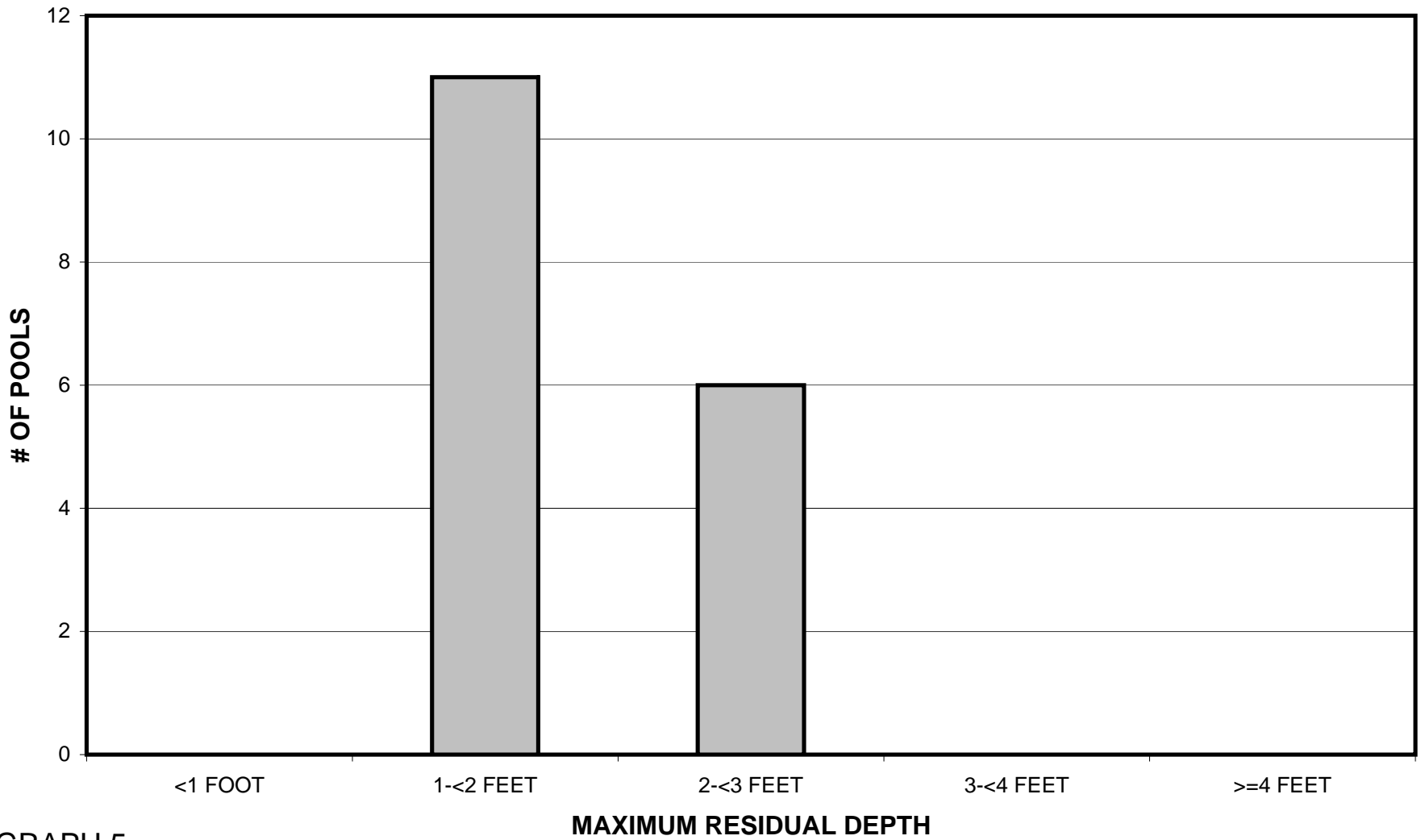
GRAPH 3

**DOYLE CREEK 2008
POOL TYPES BY PERCENT OCCURRENCE**



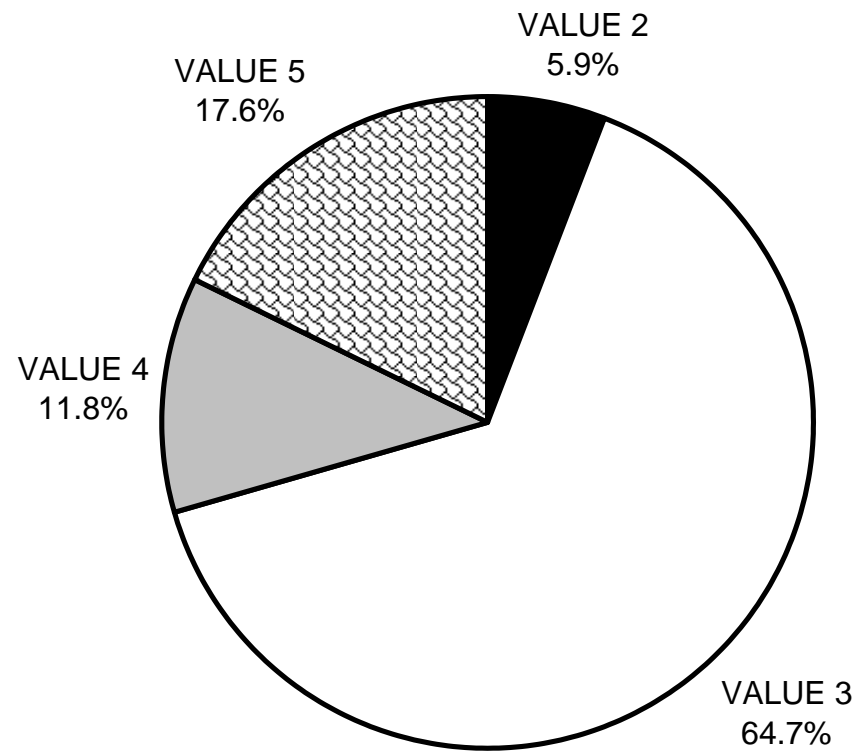
GRAPH 4

DOYLE CREEK 2008 MAXIMUM DEPTH IN POOLS



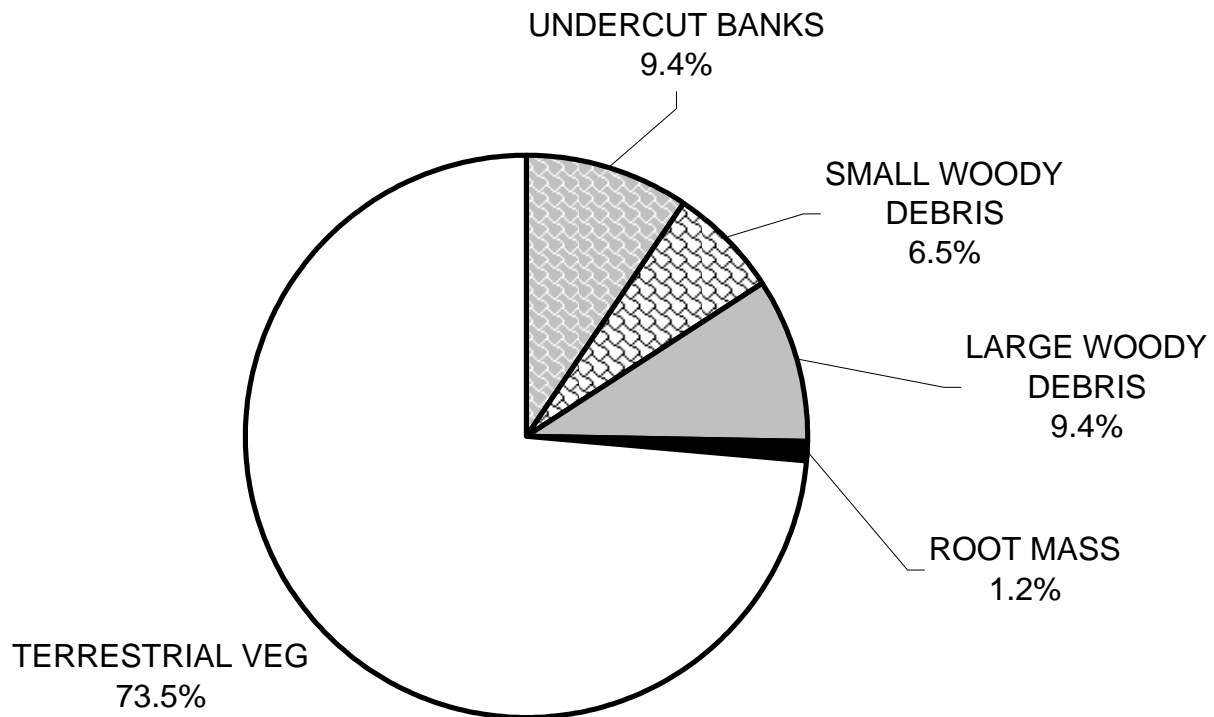
GRAPH 5

DOYLE CREEK 2008 PERCENT EMBEDDEDNESS



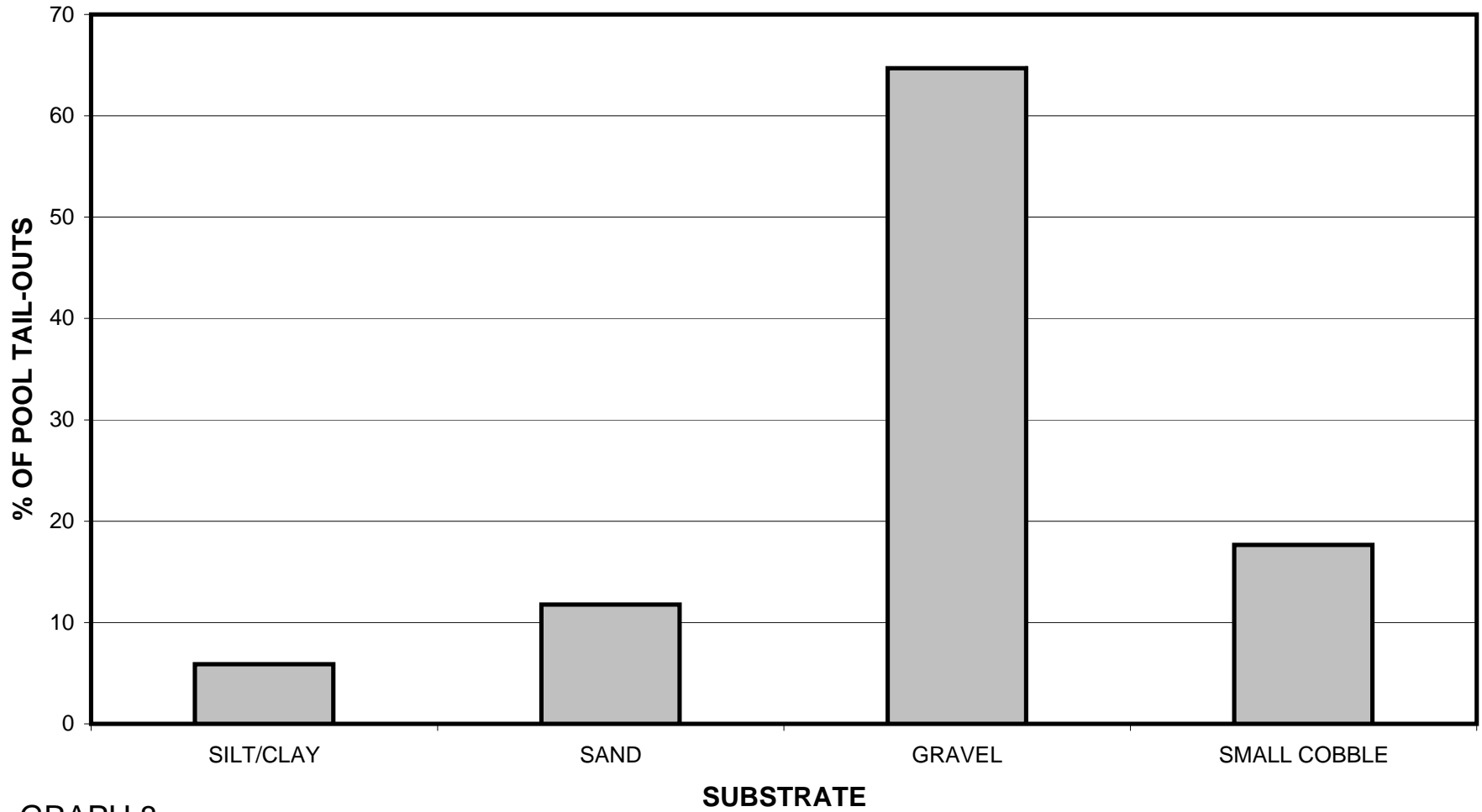
GRAPH 6

DOYLE CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



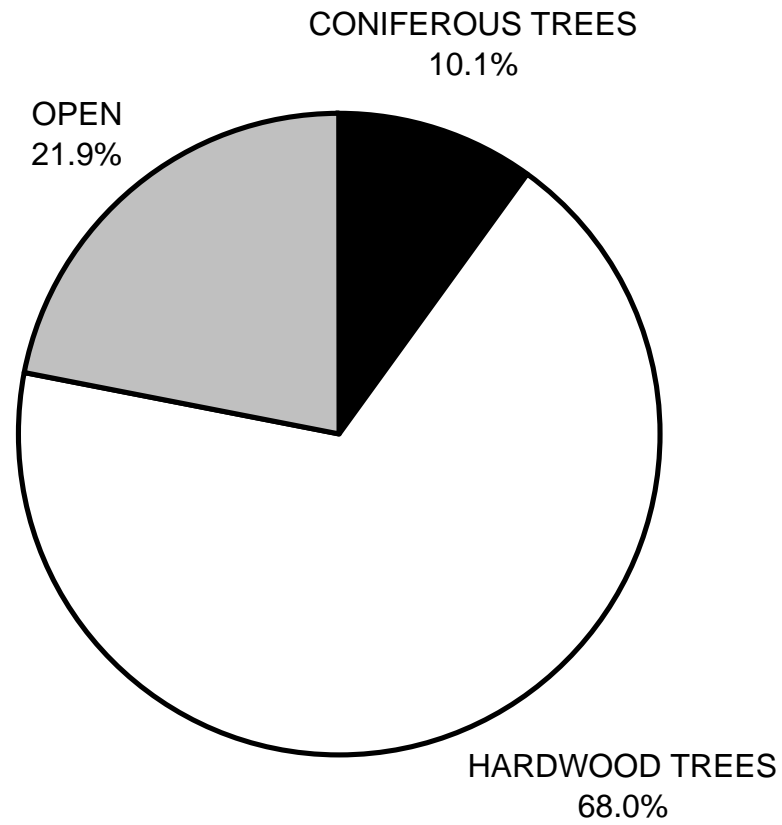
GRAPH 7

DOYLE CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



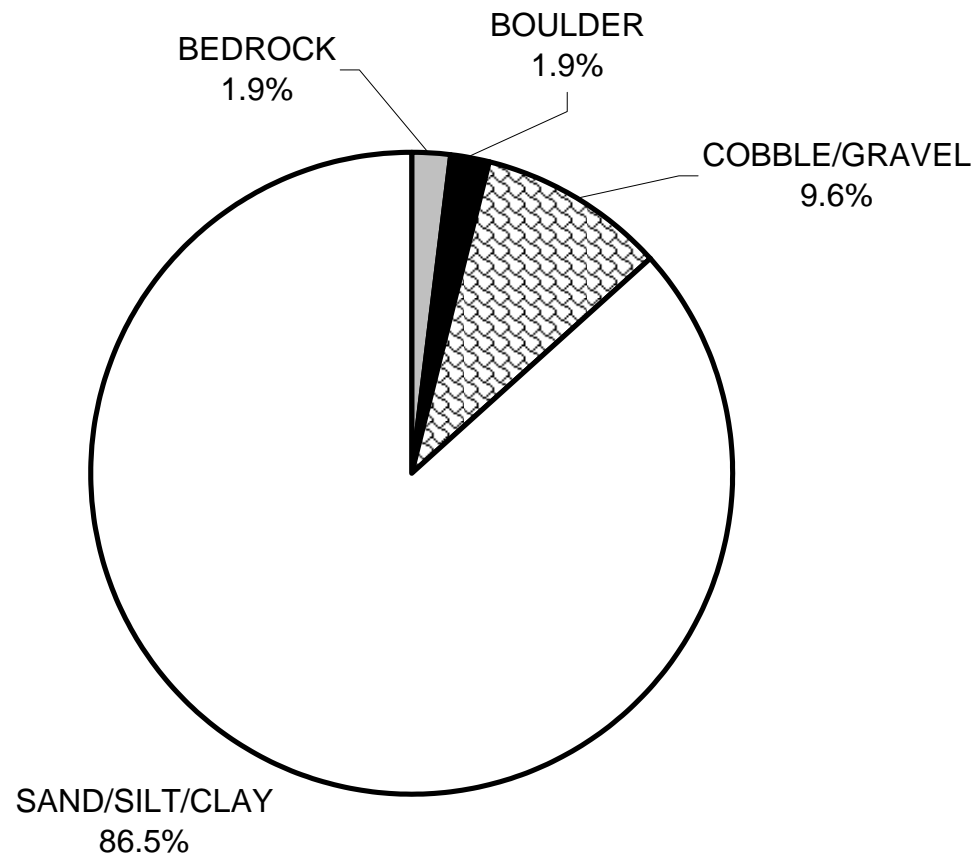
GRAPH 8

DOYLE CREEK 2008 MEAN PERCENT CANOPY



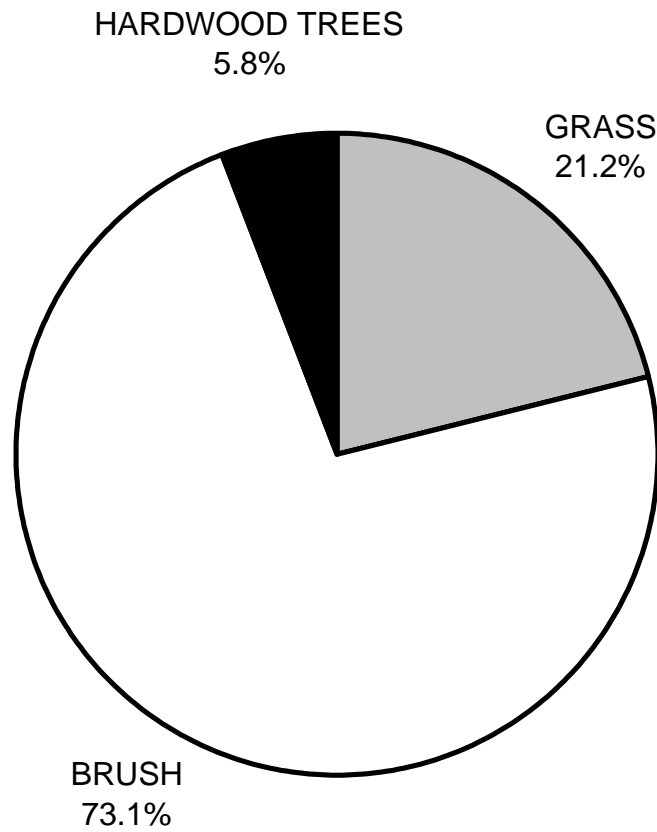
GRAPH 9

DOYLE CREEK 2008 DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

DOYLE CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH

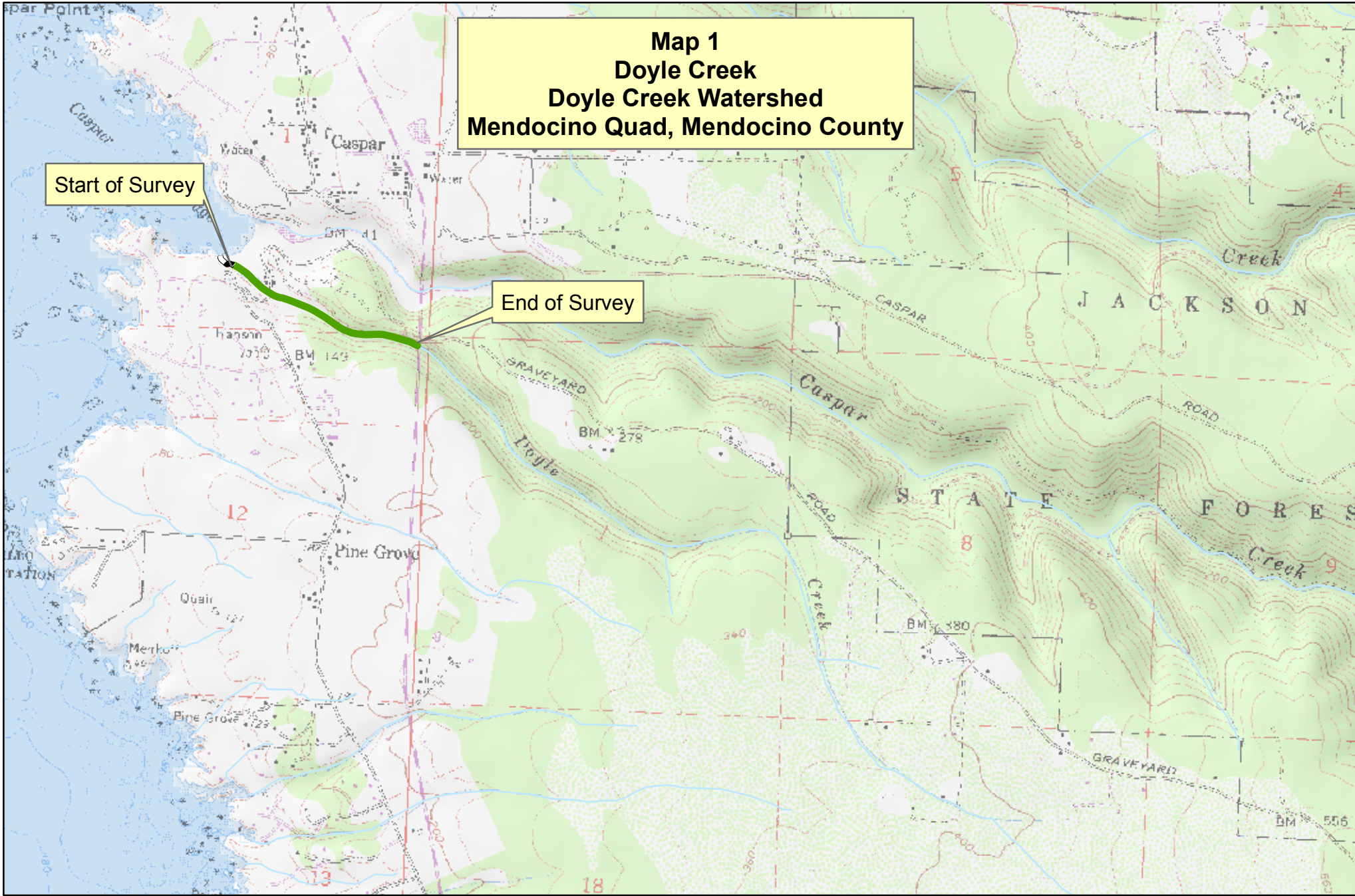


GRAPH 11



**Map 1
Doyle Creek
Doyle Creek Watershed
Mendocino Quad, Mendocino County**

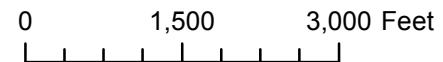
Start of Survey

End of Survey



Legend

-  Reach 1, Not Surveyed
-  Reach 2, F5 Channel Type



Start and end survey points are approximate.

