

STREAM INVENTORY REPORT

Gray Creek

INTRODUCTION

A stream inventory was conducted from September 19 to September 26, 2011 on Gray Creek. The survey began at the confluence with Big Lagoon and extended upstream 2.7 miles.

The Gray 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 Gray Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, steelhead trout and cutthroat trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Gray Creek is a tributary to Big Lagoon, which drains to the Pacific Ocean. It is located in Humboldt County, California (Map 1). Gray Creek's legal description at the confluence with Big Lagoon is T09N R01E S19. Its location is 41.15617 degrees north latitude and 124.10493 degrees west longitude, LLID number 1241061411595. Gray Creek is a first order stream and has approximately 3.4 miles of blue line stream according to the USGS Rodgers Peak 7.5 minute quadrangle. Gray Creek drains a watershed of approximately 1.8 square miles. Elevations range from about 10 feet at the mouth of the creek to 770 feet in the headwater areas. Mixed hardwood and mixed conifer forests dominate the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Hammond Truck Road off U.S. Highway 101.

METHODS

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

Gray Creek

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 Gray 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". Gray 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 Gray Creek, embeddedness was

Gray Creek

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 not suitable 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. In Gray 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. Next, 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent 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 Gray 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 Gray 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

Gray Creek

elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Gray Creek. In addition, six sites were electrofished using a Smith-Root Model LR-24 electrofisher. Underwater observations were made at 14 sites. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

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 Gray Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length

Gray Creek

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of September 19 to September 26, 2011, was conducted by M. Groff and I. Mikus (DFG). The total length of the stream included in this report is 14,413 feet. A total of 6,220 feet of stream was not surveyed. At 387 feet upstream from the mouth, there is a 1,920 foot long pond followed by a 3,340 foot marsh that was not surveyed. At 7,715 feet upstream from the mouth, there is another 960 feet of marsh that was not surveyed. The data included in this report are for the 8,193 feet of stream actually surveyed.

Stream flow was measured twice on Gray Creek with a Marsh-McBirney Model 2000 flowmeter on September 22, 2011. The first flow was measured in the spillway of the check dam below the large pond approximately 460' from the confluence with Big Lagoon. The flow was measured to be 2.55 cfs. The second flow was measured above the marsh above the large pond, approximately 5,870 feet upstream from the confluence with Big Lagoon. The second flow was measured to be 2.68 cfs.

Gray Creek is a C6 channel type for the first 387 feet of the stream surveyed (Reach 1), an un-surveyed pond for 1,920 feet (Reach 2), an un-surveyed marsh for 3,340 feet (Reach 3), an E5 channel type for 2,068 feet of the stream surveyed (Reach 4), an un-surveyed marsh for 960 feet (Reach 5), a G5 channel type for 5,136 feet of the stream surveyed (Reach 6), and an A4 channel type for 602 feet of the stream surveyed (Reach 7). C6 channels are meandering point-bar, riffle/pool, alluvial channels with broad well defined floodplain on low gradients and silt-dominant substrates. E5 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and sand-dominant substrates. G5 channels are entrenched "gully" step-pool channels on moderate gradients with low width /depth ratios and sand-dominant substrates. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 53 degrees Fahrenheit. A water temperature of 65 degrees Fahrenheit was recorded in the marsh at the confluence with Big Lagoon and Gray Creek. Air temperatures ranged from 54 to 63 degrees Fahrenheit.

Gray Creek

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 48% pool units, 44% flatwater units, 7% riffle units, and 1% culvert units (Graph 1). Based on total length of Level II habitat types there were 84% flatwater units, 14% pool units, and 2% riffle units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were run units, 31%; mid-channel pool units, 23%; and step-run units, 14% (Graph 3). Based on percent total length, run units made up 44%, step-run units 41%, and mid-channel pool units 8%.

A total of 71 pools were identified (Table 3). Scour pools were the most frequently encountered at 52% (Graph 4), and comprised 44% 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 71 pools (8%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 71 pool tail-outs measured, 1 had a value of 1 (1.4%); 8 had a value of 2 (11.3%); 13 had a value of 3 (18.3%); 18 had a value of 4 (25.4%); 31 had a value of 5 (43.7%) (Graph 6). The substrate types of the 31 pool tail-outs with embeddedness values of 5 consisted of sand, 28; silt/clay, 2; and boulders, 1. On this scale, a value of 1 indicates the highest quality of spawning substrate. Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate such as sand, bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 0, flatwater habitat types had a mean shelter rating of 6, and pool habitats had a mean shelter rating of 34 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 37. Main channel pools had a mean shelter rating of 30 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Gray Creek. Graph 7 describes the pool cover in Gray Creek. Undercut banks are 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. Sand was the dominant substrate observed in 75% of the pool tail-outs. Gravel was the next most frequently observed dominant substrate type and occurred in 20% of the pool tail-outs. Pool tail-outs with gravel as a dominant substrate type occurred more frequently in Reach 6 and Reach 7 (29.5%) compared to Reaches 1 through 5 (3.7%). These Reaches are above the pond and marsh sections of Gray Creek.

The mean percent canopy density for the surveyed length of Gray Creek was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 70% and 30%, respectively. Graph 9 describes the mean percent canopy in Gray Creek.

Gray Creek

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 97%. The dominant elements composing the structure of the stream banks consisted of 95% sand/silt/clay, 4% bedrock, and 1% boulder (Graph 10). Deciduous trees were the dominant vegetation type observed in 44% of the units surveyed. Additionally, 30% of the units surveyed had brush as the dominant vegetation type, and 20% had coniferous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted an electrofishing survey at six sites for species composition and distribution in Gray Creek on September 27, 2011. The electrofishing survey consisted of a single pass with no block nets. Additionally, a snorkel survey was conducted at 14 sites on September 21, 2011. Water temperatures taken during the survey periods ranged from 52 to 66 degrees Fahrenheit. Air temperatures ranged from 51 to 64 degrees Fahrenheit. The sites were sampled by E. Helgoth, I. Mikus, and M. Groff (DFG).

In reach 1, which comprised the first 387 feet of stream, five sites were sampled. The water temperature was 66 degrees Fahrenheit. The reach sites yielded three age 1+ steelhead/rainbow trout (SH/RT), two young-of-the-year (YOY) cutthroat trout, one YOY Chinook salmon, six YOY unknown (SH/RT or cutthroat) trout, one crappie, one three-spine stickleback, and 28 sculpin.

In reach 3, multiple sites were sampled starting approximately 2,280 feet from the confluence with Big Lagoon and continuing upstream 660 feet. The water temperature was 53 degrees Fahrenheit. The reach sites yielded five YOY cutthroat trout, four age 1+ cutthroat trout, three YOY unknown (SH/RT or cutthroat) trout, and 15 sculpin.

In reach 4, eight sites were sampled starting approximately 5,323 feet from the confluence with Big Lagoon and continuing upstream 1,767 feet. The water temperature was 52 degrees Fahrenheit. The reach sites yielded five YOY unknown (SH/RT or cutthroat) trout, and three age 1+ unknown (SH/RT or cutthroat) trout.

In reach 6, six sites were sampled starting approximately 9,471 feet from the confluence with Big Lagoon and continuing upstream 1,333 feet. The water temperature was 52 degrees Fahrenheit. The reach sites yielded one age 1+ cutthroat trout, five YOY unknown (SH/RT or cutthroat) trout, and three age 1+ unknown (SH/RT or cutthroat) trout.

Gray Creek

The following chart displays the information yielded from these sites:

2011 Gray Creek underwater*/electrofishing observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT		Cutthroat Trout		Unknown trout	
					1+	YOY	1+	YOY	1+	
Reach 1: C6 Channel Type										
09/27/11	1	005	Pool	149	0	1	0	0	0	
09/27/11	2	007	Pool	188	0	0	0	0	0	
09/27/11	3	008	Step-run	320	0	1	0	4	0	
09/27/11	4	009	Pool	330	1	0	0	1	0	
09/27/11	5	011	Pool	352	2	0	0	1	0	
Reach 3: Marsh										
09/27/11	6	014	Marsh	2,940	0	5	4	3	0	
Reach 4: E5 Channel Type										
09/21/11	7*	016	Pool	5,337	0	0	0	1	0	
09/21/11	8*	022	Pool	5,896	0	0	0	0	1	
09/21/11	9*	024	Pool	5,934	0	0	0	1	0	
09/21/11	10*	026	Pool	6,146	0	0	0	1	0	
09/21/11	11*	028	Pool	6,257	0	0	0	0	2	
09/21/11	12*	030	Pool	6,315	0	0	0	0	0	
09/21/11	13*	032	Pool	6,357	0	0	0	1	0	
09/21/11	14*	040	Pool	7,090	0	0	0	1	0	
Reach 6: G5 Channel Type										
09/21/11	15*	073	Pool	9,478	0	0	0	0	1	
09/21/11	16*	077	Pool	9,756	0	0	0	0	1	
09/21/11	17*	079	Pool	9,844	0	0	1	2	0	
09/21/11	18*	081	Pool	9,973	0	0	0	1	1	
09/21/11	19*	085	Pool	10,138	0	0	0	1	0	
09/21/11	20*	095	Pool	10,804	0	0	0	1	0	

DISCUSSION

Gray Creek is a C6 channel type for the first 387 feet of stream surveyed, a pond for the next 1,920 feet, a marsh for the next 3,340 feet, an E5 channel type for the next 2,068 feet, a marsh for the next 960 feet, a G5 for the next 5,136 feet, and an A4 channel type for the remaining 602 feet. The suitability of C6, E5, G5, and A4 channel types for fish habitat improvement structures

Gray Creek

is as follows: C6 channels are good for bank-placed boulders and log cover and fair for plunge weirs. E5 channels are good for bank-placed boulders and fair for opposing wing-deflectors. G5 channels are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover. A4 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey days September 19 to September 26, 2011, ranged from 52 to 65 degrees Fahrenheit. Air temperatures ranged from 54 to 63 degrees Fahrenheit. The water temperatures above the pond are good for salmonids. The water temperature below the pond if sustained, are near the threshold stress level for salmonids.

Flatwater habitat types comprised 84% of the total length of this survey, riffles 2%, and pools 14%. Six of the 71 (8%) 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 large wood that will increase or deepen pool habitat is recommended in Reaches 1, 4 and 6.

Nine of the 71 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirty-one of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-one 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. Potential erosion sites that may deliver sediment to Gray Creek should be treated.

Fifty-seven of the 71 pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids. Reaches 4 and 6 contain gravel suitable for spawning.

The mean shelter rating for pools is 34. The shelter rating in the flatwater habitats is 6. 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 Gray Creek. Undercut banks are 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 97%. Reach 1 had a canopy density of 97%, Reach 4 had a canopy density of 94%, Reach 6 had a canopy density of 99%, and Reach 7 had a canopy density of 97%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 97% and 97%, respectively.

RECOMMENDATIONS

- 1) Gray Creek should be managed as an anadromous, natural production stream.

Gray Creek

- 2) The water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids above the pond. It appears the water is warming up in the impoundment.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from undercut banks. 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 treated according to their potential for sediment yield to the stream and its tributaries.
- 5) Investigate alternatives to provide anadromous fish passage at the road/levee crossing (located 352 feet from the confluence).

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 the confluence with Big Lagoon. The channel is a C6.
342	0011.00	There is a 2.7' high plunge over concrete step to culvert/spillway of check dam.
352	0012.00	A road/levee crosses the channel. The crossing is a 5' high x 6' wide x 35' long concrete box culvert. The slope of the culvert is 0%. There is a 2.7' high plunge at the outlet with a maximum water depth of 2' within 5' of the outlet. At the inlet of the culvert there is a 3' high plunge over a check dam to a large pond. The maximum depth within 5' of the check dam is 0.4'. The culvert is a barrier to anadromous salmonids due to the plunges at the outlet and inlet.
387	0013.00	5,260 feet of stream were not surveyed due to a large pond (approximately 70 acres) with a marsh above it. The pond measures approximately 1,920 feet long; the marsh measures approximately 3,340 feet long. The pond constitutes Reach 2 and the marsh constitutes Reach 3.
5647	0015.00	End of unsurveyed section. The channel is an E5 (Reach 4).
6345	0032.00	Tributary #01 enters on the left bank. It contributes approximately 5% to Gray Creek's flow. The water temperature of the tributary is 52

Gray Creek

degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 52 degrees Fahrenheit.

- 6357 0033.00 A redwood log collapsed into the channel and now has a large conifer growing out of it. The roots of the conifer are growing along the log and across the wetted width of the stream. The roots have collected sediment, creating a natural bridge across the channel (approximately 2' high x 5' long x 10' wide). The stream must flow underneath the combined log, roots, and sediment, there are no visible gaps.
- 7298 0046.00 The stream flows under massive redwood log; there are no visible gaps beneath it.
- 7715 0060.00 Approximately 960' of stream were not surveyed due to a large marsh. The marsh is Reach 5.
- 8675 0061.00 End of unsurveyed section. The channel type is a G5 (Reach 6).
- 9323 0071.00 A redwood log collapsed into the channel; the roots of the conifer are growing along the log and across the wetted width of the stream. The roots have collected sediment, creating a natural bridge across the channel. The stream must flow underneath the combined log, roots, and sediment and there are no visible gaps.
- 9478 0074.00 A downed log across the channel.
- 9844 0080.00 Right bank seep.
- 10126 0085.00 An erosion site on the right bank measures approximately 6' high x 20' long; it is contributing fine sediment and sand to the channel.
- 10138 0086.00 Tributary #02 enters on the left bank through two different channels. It contributes approximately 5% to Gray Creek's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 52 degrees Fahrenheit. The slope of the tributary is approximately 30%.
- 10206 0087.00 Log debris accumulation (LDA) #01 contains over 20 pieces of large woody debris (LWD) and measures 9' high x 35' wide x 80' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to sand and measures 10' wide x 10' long x 2' deep. Fish are present above the LDA.
- 10217 0088.00 LDA #02 contains five pieces of LWD and measures 3' high x 12' wide x 10' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to gravel and measures 10' wide x 5' long x 1' deep. Fish are present above the LDA.

Gray Creek

- 10422 0089.00 Left bank seep.
- 10448 0090.00 Tributary #03 enters on the right bank. It contributes approximately 5% to Gray Creek's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit. The slope of the tributary is approximately 15%.
- 10583 0091.00 Right bank seep.
- 10717 0094.00 Half of the flow goes underground for approximately 40 feet.
- 11281 0102.00 LDA #03 contains five pieces of LWD and measures 4' high x 18' wide x 17' long. Water flows through the LDA, but there are no visible gaps in it; the water must flow under a redwood log that spans the wetted width of the channel. The LDA is not retaining sediment. Fish are present above the LDA.
- LDA #04 contains 10 pieces of LWD and measures 6' high x 30' wide x 5' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to sand and measures 15' wide x 20' long x 2' deep. Fish are present above the LDA.
- LDA #05 contains 5-10 pieces of LWD and measures 5.5' high x 19' wide x 7' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to sand and measures 10' wide x 20' long x 4' deep. Fish are present above the LDA.
- 11768 0104.00 The roots of a conifer are growing across the wetted width of the stream. The root mass has collected woody debris and sediment, forming a natural bridge approximately 5' wide across the channel. There are no visible gaps beneath the debris.
- The stream splits into two channels with equal amounts of water. One channel flows for approximately 30 feet then goes underground. The other channel flows continuously.
- 11985 0108.00 Tributary #04 enters on the left bank. It contributes approximately 1% to Gray Creek's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit. The slope of the tributary is approximately 10%. The tributary not accessible to salmonids due to a 12' high plunge approximately 30' upstream from the mouth.

Gray Creek

The stream splits into two channel with equal amounts of water. One channel flows for approximately 20 feet then goes underground. The other channel flows continuously.

12379 0112.00 The roots of a conifer are growing across the wetted width of the stream. The root mass has collected woody debris and sediment, forming a natural bridge approximately 12' wide across the channel. There are no visible gaps beneath the debris.

12775 0118.00 There is a 1.3' high plunge over root mass.

12921 0124.00 Left bank seep.

LDA #06 contains over five pieces of LWD and measures 6' high x 15' wide x 14' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to sand and measures 10' wide x 10' long x 2' deep. Fish are present above the LDA.

12950 0126.00 The roots of a conifer are growing across the wetted width of the stream. The root mass has collected woody debris and sediment, forming a natural bridge approximately 14' wide across the channel. There are no visible gaps beneath the debris.

LDA #07 consists of a massive redwood rootwad with two logs growing out of it (one log has a diameter of 1.5' the other log has a diameter >6') and measures 12' high x 13' wide x 50' long. The rootwad creates the main bulk of the LDA, while the two logs lie in the channel upstream of the LDA. Water flows through the LDA and there are no visible gaps in it. The LDA is not retaining sediment. Fish are present above the LDA.

13531 0139.00 There is a 2' high plunge over woody debris and root mass.

13545 0140.00 Last young-of-the-year (YOY) salmonids observed.

13570 0141.00 Tributary #05 enters on the right bank. It contributes approximately 5% to Gray Creek's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit. The slope of the tributary is approximately 10%.

LDA #08 contains over 15 pieces of LWD and measures 7' high x 20' wide x 30' long. Water flows through the LDA and there are no visible gaps in it. The LDA is not retaining sediment. It is a possible barrier to juvenile and adult salmonids. Immediately upstream of the LDA there is a massive redwood stump (>10' diameter) that arches over the channel.

13811 0145.00 The channel changes from a G5 to an A4 (Reach 7).

Gray Creek

LDA #09 consists of five pieces of LWD, small woody debris, root mass, and retained sediment that combine to form a natural bridge that entirely covers the stream. It measures 6' high x 14' wide x 58' long. Water flows through the debris accumulation, but there are no visible gaps in it. The retained sediment ranges from silt to sand and measures 30' wide x 58' long x 2' deep. It is a possible barrier to juvenile and adult salmonids.

LDA #10 contains two pieces of LWD and measures 6' high x 17' wide x 8' long. Water flows through the LDA, but there are no visible gaps in it; the water must flow underneath woody debris and sediment. Immediately upstream of the LDA there is a 3.2' high plunge over woody debris and root mass into a 1' deep pool. It is a possible barrier to juvenile and adult salmonids.

- | | | |
|-------|---------|---|
| 14079 | 0146.00 | There is a 1' high plunge over root mass and woody debris. |
| 14099 | 0148.00 | The roots of a conifer are growing across the wetted width of the stream. The root mass has collected woody debris and sediment, forming a natural bridge approximately 10' wide across the channel. There are no visible gaps beneath the debris; it may be a possible barrier to salmonids. |
| 14371 | 0150.00 | End of survey due to time constraints, not necessarily the end of the anadromous fish habitat. No fish were observed above Habitat Unit #140. |

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.

Gray Creek

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: Gray Creek

LLID: 1241061411595 Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK Legal Description: T000R000S00 Latitude: 41:09:34.0N Longitude: 124:06:22.0

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
1	0	CULVERT	0.7	35	35	0.4									
65	8	FLATWATER	44.2	106	6889	84.1	7.5	0.4	1.0	511	33191	226	14663		6
1	0	NOSURVEY		1920	1920										
2	0	NOSURVEY_		2150	4300										
71	71	POOL	48.3	16	1106	13.5	7.2	0.4	1.2	106	7537	102	7262	43	34
10	2	RIFFLE	6.8	16	163	2.0	8.5	0.4	0.6	90	896	30	305		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
150	81				14413					41624			22229		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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 (%)
9	2	LGR	6.1	17	151	1.8	8	0.4	0.6	90	807	30	274		0	96
1	0	HGR	0.7	12	12	0.1										
45	4	RUN	30.6	79	3560	43.5	8	0.5	1.1	372	16725	158	7111		6	99
20	4	SRN	13.6	166	3329	40.6	7	0.4	1.3	650	12992	293	5863		6	99
34	34	MCP	23.1	18	618	7.5	7	0.4	2.3	111	3787	116	3952	46	30	95
7	7	CRP	4.8	13	89	1.1	7	0.3	1.6	84	586	69	485	27	20	99
8	8	LSL	5.4	17	136	1.7	8	0.4	1.7	146	1172	133	1067	63	24	99
1	1	LSR	0.7	15	15	0.2	6	0.3	0.7	90	90	63	63	27	20	100
8	8	LSBk	5.4	14	114	1.4	7	0.4	1.6	99	792	85	681	37	19	99
13	13	PLP	8.8	10	134	1.6	8	0.5	2.1	85	1111	78	1014	39	67	97
1	0	CUL	0.7	35	35	0.4										
1	0	NS		1920	1920											
2	0	MAR		2150	4300											

Total Units
150

Total Units Fully Measured
81

Total Length (ft.)
14413

Total Area (sq.ft.)
38060

Total Volume (cu.ft.)
20509

Table 3 - Summary of Pool Types

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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
34	34	MAIN	48	18	618	56	6.7	0.4	111	3787	46	1548	30
37	37	SCOUR	52	13	488	44	7.7	0.4	101	3750	41	1522	37
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
71	71				1106					7536		3069	

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

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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
34	MCP	48	10	29	20	59	4	12	0	0	0	0
7	CRP	10	4	57	3	43	0	0	0	0	0	0
8	LSL	11	3	38	5	63	0	0	0	0	0	0
1	LSR	1	1	100	0	0	0	0	0	0	0	0
8	LSBk	11	3	38	5	63	0	0	0	0	0	0
13	PLP	18	3	23	8	62	2	15	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
71	24	34	41	58	6	8	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Dry Units: 0

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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
9	2	LGR	0	0	0	0	0	0	0	0	0
1	0	HGR									
10	2	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
45	4	RUN	13	63	25	0	0	0	0	0	0
20	4	SRN	0	90	10	0	0	0	0	0	0
65	8	TOTAL FLAT	6	76	18	0	0	0	0	0	0
34	34	MCP	22	27	25	9	13	2	0	1	0
7	7	CRP	52	14	13	7	14	0	0	0	0
8	8	LSL	13	30	42	1	13	0	1	0	0
1	1	LSR	0	0	0	100	0	0	0	0	0
8	8	LSBk	50	27	0	7	16	0	0	0	0
13	13	PLP	8	9	22	2	3	0	54	2	0
71	71	TOTAL POOL	24	22	22	8	11	1	10	1	0
1	0	CUL									
1	0	NS									
2	0	MAR									
150	81	TOTAL	22	28	22	7	10	1	9	1	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Dry Units: 0

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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
9	2	LGR	0	0	100	0	0	0	0
1	0	HGR	0	0	0	0	0	0	0
45	4	RUN	0	75	25	0	0	0	0
20	4	SRN	0	75	25	0	0	0	0
34	34	MCP	0	97	3	0	0	0	0
7	7	CRP	0	100	0	0	0	0	0
8	8	LSL	0	100	0	0	0	0	0
1	1	LSR	0	100	0	0	0	0	0
8	8	LSBk	0	100	0	0	0	0	0
13	13	PLP	0	85	8	0	0	8	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	30	70	0	97	97

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: Gray Creek LLID: 1241061411595 Drainage: Big Lagoon
 Survey Dates: 9/19/2011 to 9/26/2011 Survey Length (ft.): 14413 Main Channel (ft.): 14413 Side Channel (ft.): 0
 Confluence Location: Quad: RODGERS PEAK Legal Description: T000R000S00 Latitude: 41:09:34.0N Longitude: 124:06:22.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: C6	Canopy Density (%): 96.8	Pools by Stream Length (%): 37.7
Reach Length (ft.): 387	Coniferous Component (%): 0.0	Pool Frequency (%): 50.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%): 100.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 50
Range (ft.): 10 to 14	Vegetative Cover (%): 82.9	2 to 2.9 Feet Deep: 50
Mean (ft.): 13	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 2.6	Occurrence of LWD (%): 5	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 52 - 65 Air (F): 55 - 63	LWD per 100 ft.:	Mean Pool Shelter Rating: 42
Dry Channel (ft): 0	Riffles: 7	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 50 Sand: 17 Gravel: 17 Sm Cobble: 0 Lg Cobble: 0 Boulder: 17 Bedrock: 0		
Embeddedness Values (%): 1. 16.7 2. 0.0 3. 0.0 4. 16.7 5. 66.7		

STREAM REACH: 2

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 1920	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.): 10 to 10	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.): 10	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.: 0	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.): 2.6	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 52 - 52 Air (F): 55 - 55	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		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 3340	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.): 10 to 10	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.): 10	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.: 0	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.): 2.6	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 52 - 52 Air (F): 55 - 55	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: 4

Channel Type: E5	Canopy Density (%): 93.7	Pools by Stream Length (%): 16.3
Reach Length (ft.): 2068	Coniferous Component (%): 33.0	Pool Frequency (%): 46.7
Riffle/Flatwater Mean Width (ft.): 7.0	Hardwood Component (%): 67.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 90
Range (ft.): 7 to 13	Vegetative Cover (%): 98.6	2 to 2.9 Feet Deep: 10
Mean (ft.): 11	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 2.7	Occurrence of LWD (%): 18	Mean Max Residual Pool Depth (ft.): 1.3
Water (F): 52 - 53 Air (F): 55 - 57	LWD per 100 ft.:	Mean Pool Shelter Rating: 40
Dry Channel (ft): 0	Riffles: 38	
	Pools: 5	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 100 Gravel: 0 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 0.0 3. 4.8 4. 9.5 5. 85.7		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 960	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.): 7 to 7	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.): 7	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.: 0	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.): 2.7	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 53 - 53 Air (F): 57 - 57	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: 6

Channel Type: G5	Canopy Density (%): 98.8	Pools by Stream Length (%): 11.7
Reach Length (ft.): 5136	Coniferous Component (%): 30.6	Pool Frequency (%): 50.0
Riffle/Flatwater Mean Width (ft.): 6.7	Hardwood Component (%): 69.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 98
Range (ft.): 7 to 15	Vegetative Cover (%): 97.4	2 to 2.9 Feet Deep: 2
Mean (ft.): 11	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.): 2.7	Occurrence of LWD (%): 24	Mean Max Residual Pool Depth (ft.): 1.1
Water (F): 52 - 53 Air (F): 54 - 61	LWD per 100 ft.:	Mean Pool Shelter Rating: 25
Dry Channel (ft): 0	Riffles: 3	
	Pools: 10	
	Flat: 8	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 74 Gravel: 26 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 19.0 3. 23.8 4. 35.7 5. 21.4		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 7

Channel Type: A4	Canopy Density (%): 97.3	Pools by Stream Length (%): 3.3
Reach Length (ft.): 602	Coniferous Component (%): 48.8	Pool Frequency (%): 33.3
Riffle/Flatwater Mean Width (ft.): 11.5	Hardwood Component (%): 51.3	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 100
Range (ft.): 15 to 15	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 15	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 2.7	Occurrence of LWD (%): 19	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 53 - 53	Air (F): 58 - 58	LWD per 100 ft.:
Dry Channel (ft): 0	Riffles: 0	Pools: 5
	Pools: 5	Flat: 8
	Flat: 8	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 100
	Sm Cobble: 0	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 0.0	2. 0.0	3. 100.0
	4. 0.0	5. 0.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

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	6	3.7
Boulder	1	1	1.2
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	80	74	95.1

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	5	5	6.2
Brush	20	28	29.6
Hardwood Trees	39	32	43.8
Coniferous Trees	17	16	20.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 4

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

StreamName: Gray Creek

LLID: 1241061411595

Drainage: Big Lagoon

Survey Dates: 9/19/2011 to 9/26/2011

Confluence Location: Quad: RODGERS PEAK

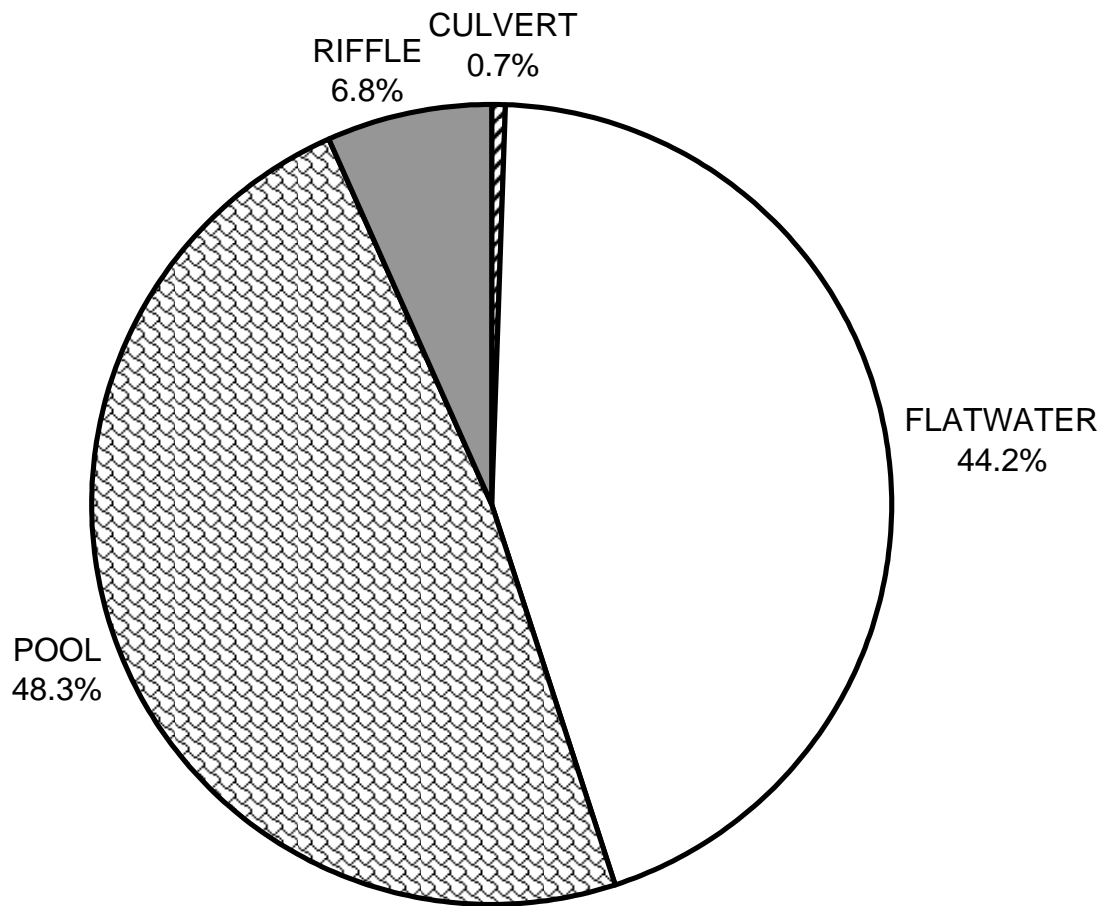
Legal Description: T000R000S00

Latitude: 41:09:34.0N

Longitude: 124:06:22.0W

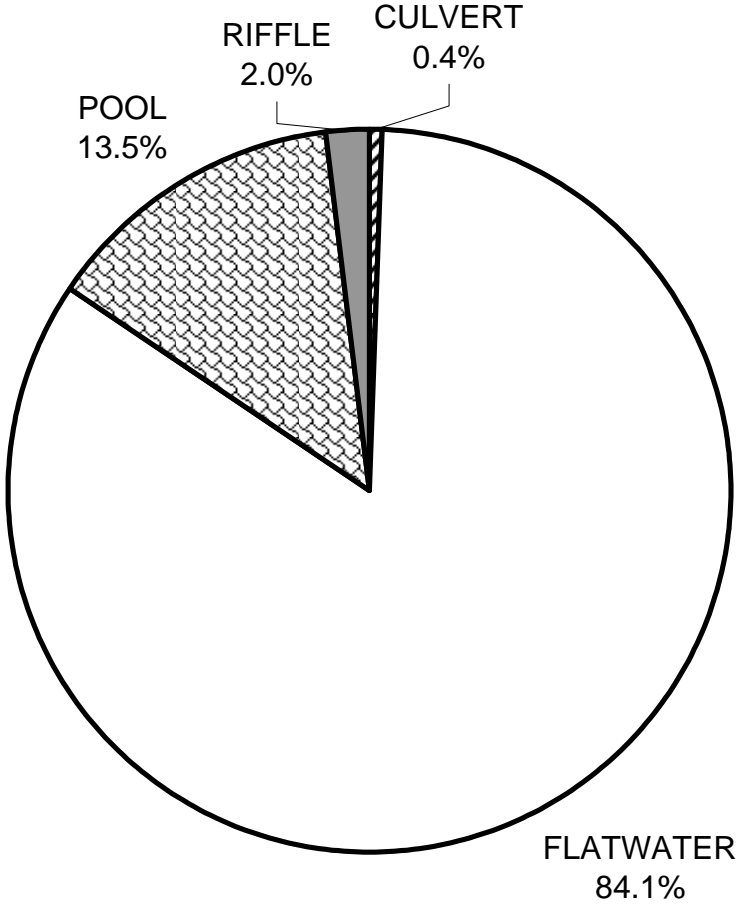
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	6	24
SMALL WOODY DEBRIS (%)	0	76	22
LARGE WOODY DEBRIS (%)	0	18	22
ROOT MASS (%)	0	0	8
TERRESTRIAL VEGETATION (%)	0	0	11
AQUATIC VEGETATION (%)	0	0	1
WHITEWATER (%)	0	0	10
BOULDERS (%)	0	0	1
BEDROCK LEDGES (%)	0	0	0

GRAY CREEK 2011 HABITAT TYPES BY PERCENT OCCURRENCE



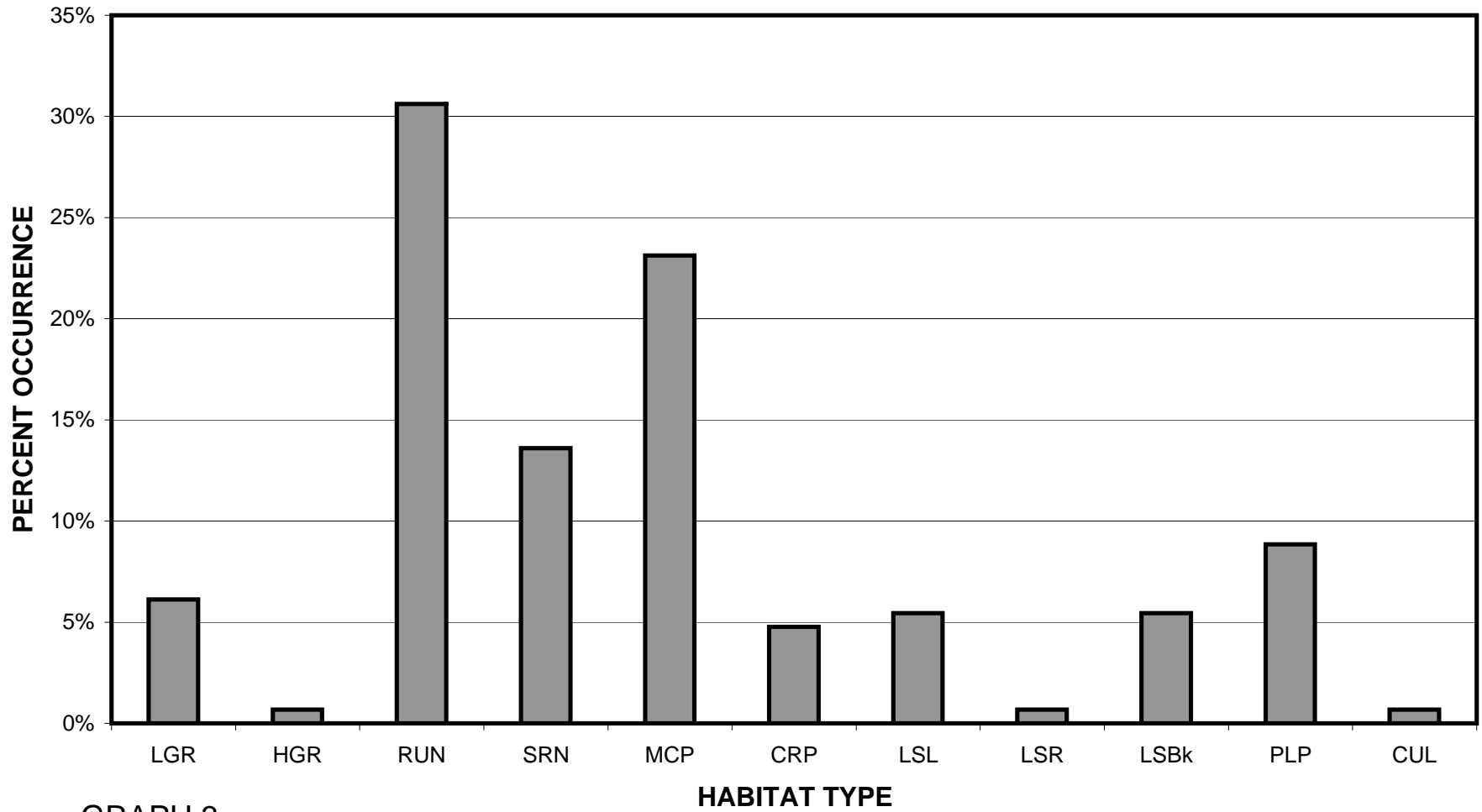
GRAPH 1

GRAY CREEK 2011 HABITAT TYPES BY PERCENT TOTAL LENGTH



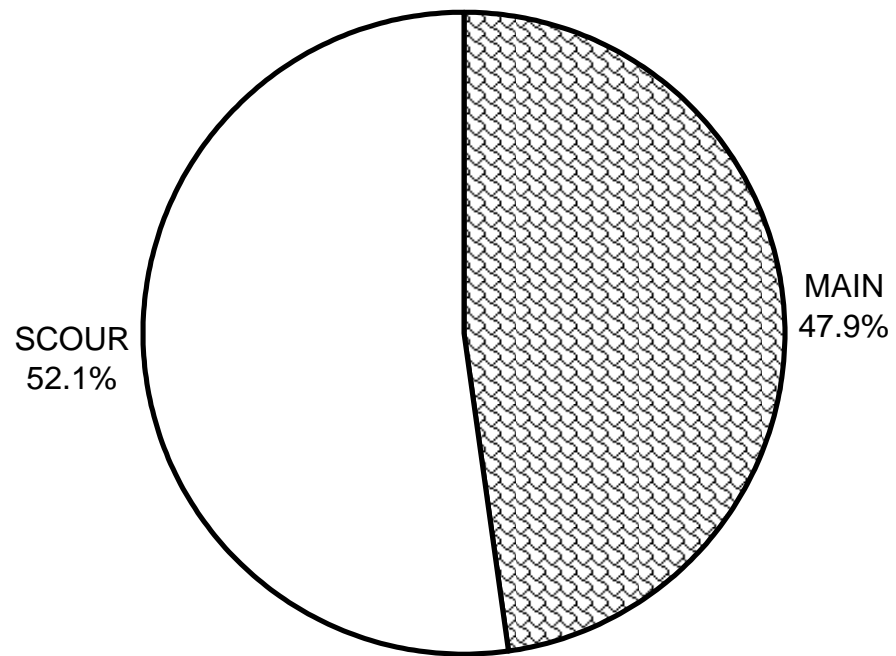
GRAPH 2

GRAY CREEK 2011 HABITAT TYPES BY PERCENT OCCURRENCE



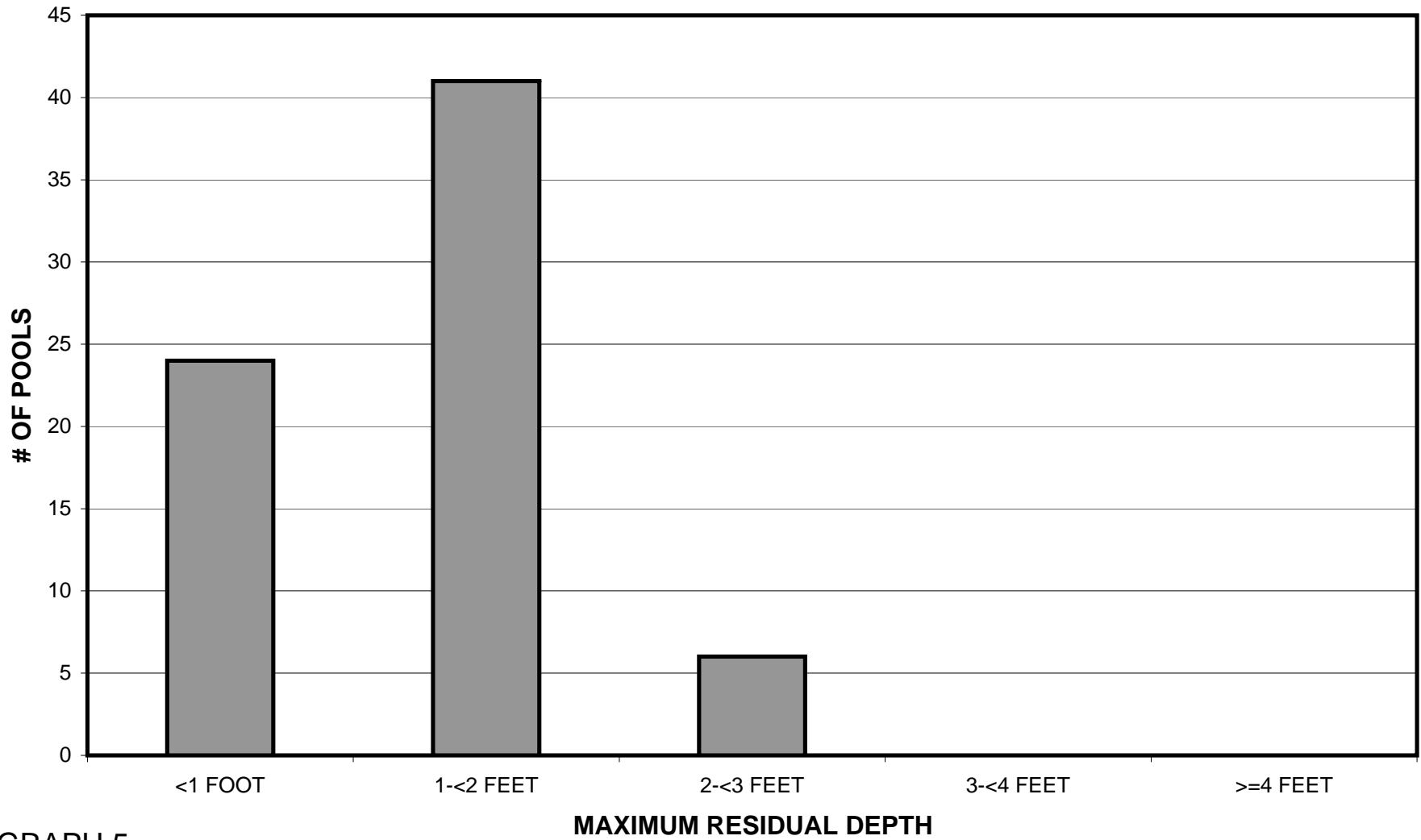
GRAPH 3

GRAY CREEK 2011 POOL TYPES BY PERCENT OCCURRENCE



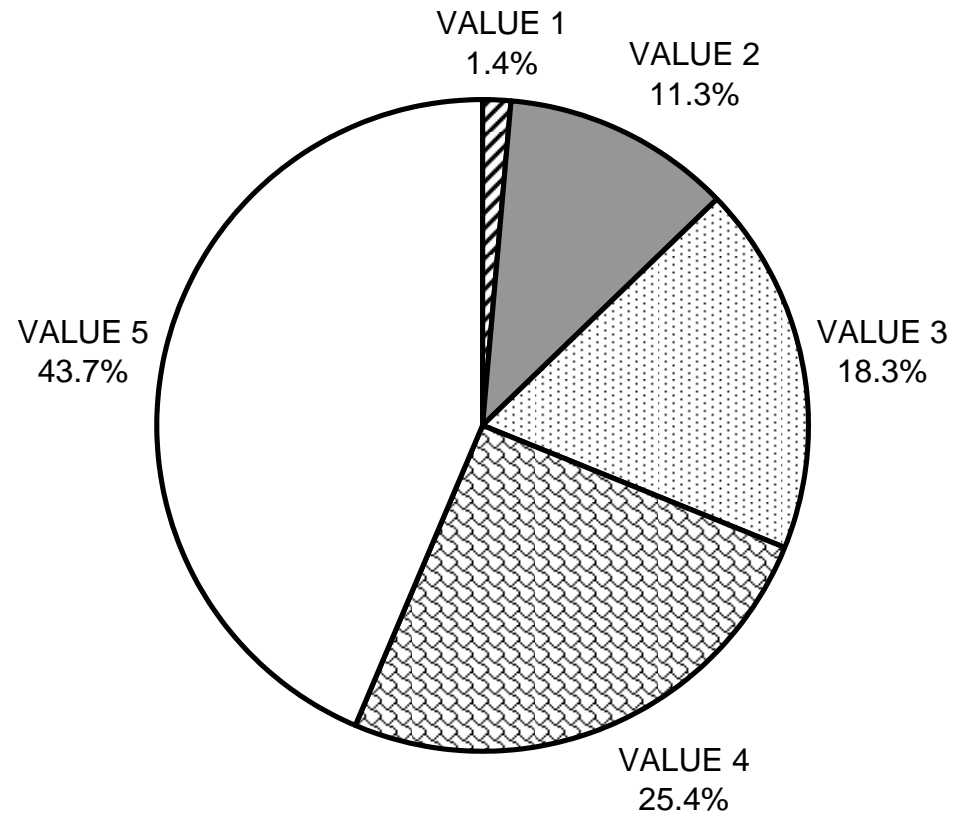
GRAPH 4

GRAY CREEK 2011 MAXIMUM DEPTH IN POOLS



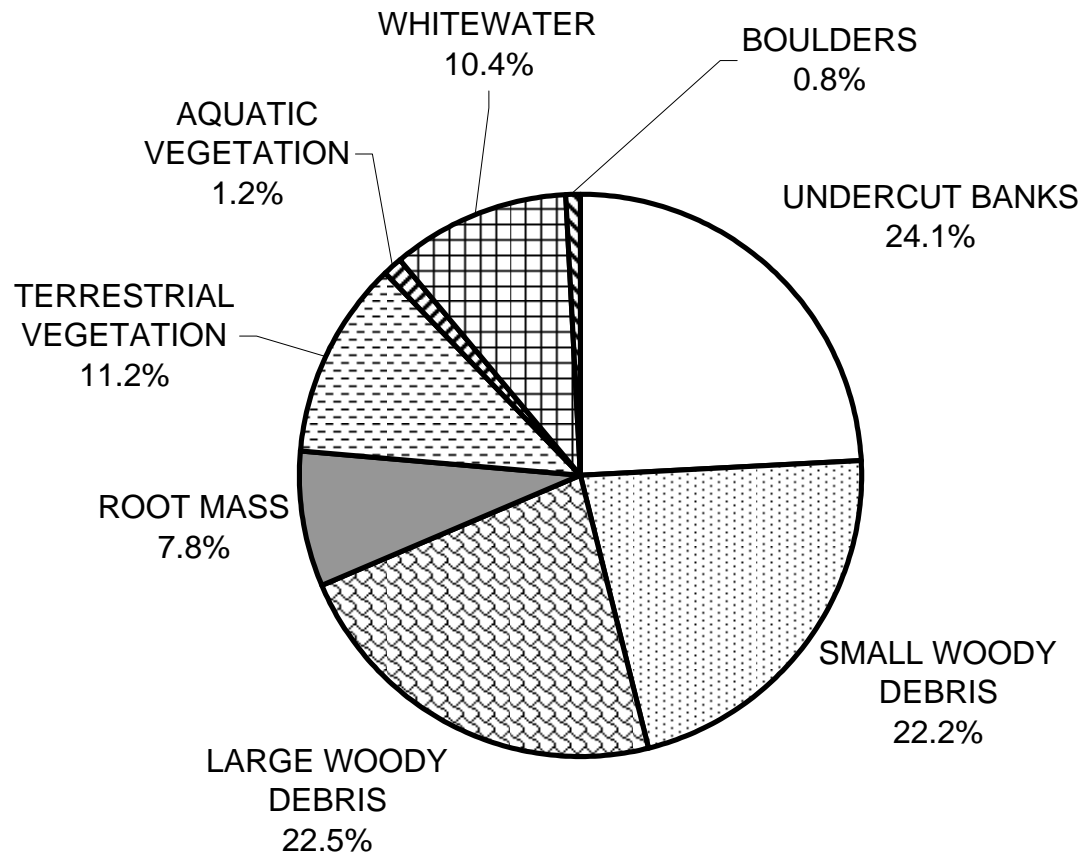
GRAPH 5

GRAY CREEK 2011 PERCENT EMBEDDEDNESS



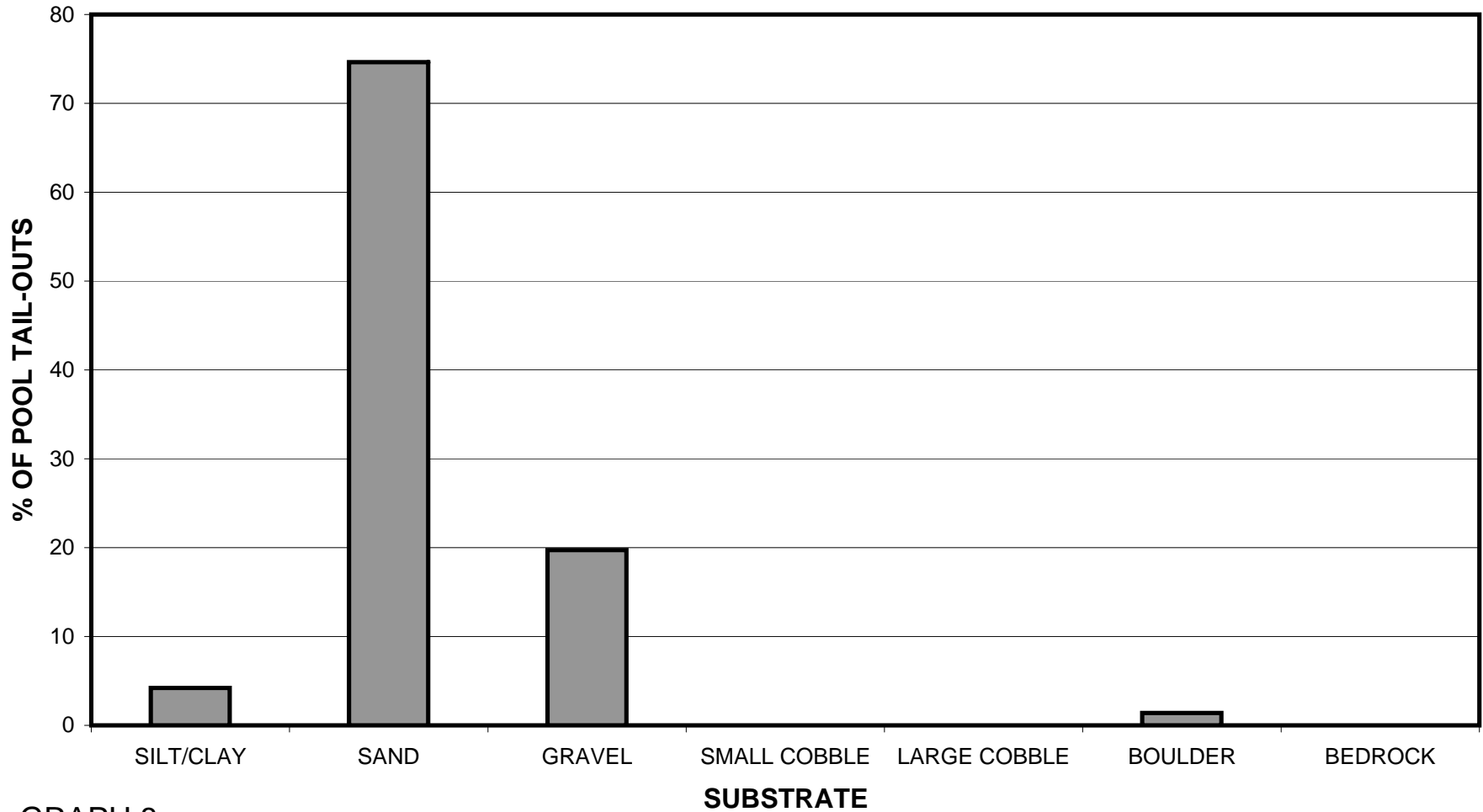
GRAPH 6

GRAY CREEK 2011 MEAN PERCENT COVER TYPES IN POOLS



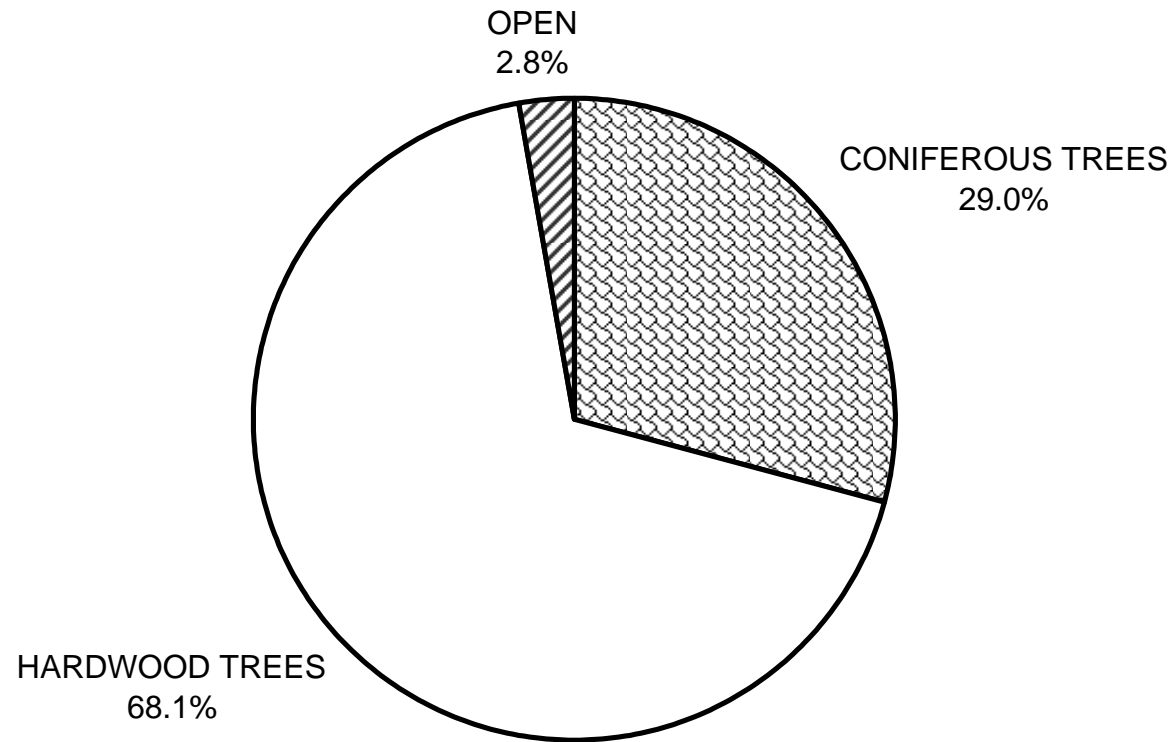
GRAPH 7

GRAY CREEK 2011 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



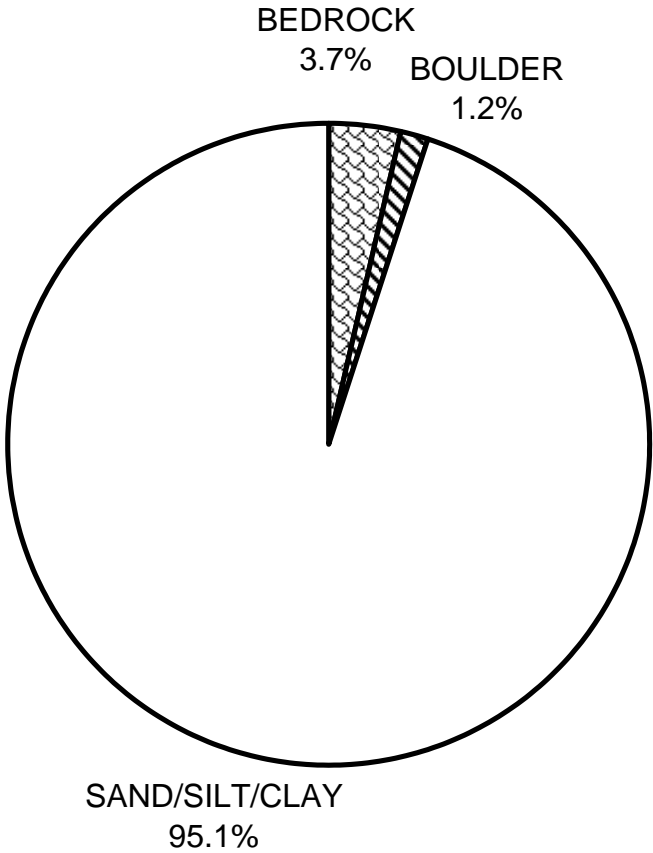
GRAPH 8

GRAY CREEK 2011 MEAN PERCENT CANOPY



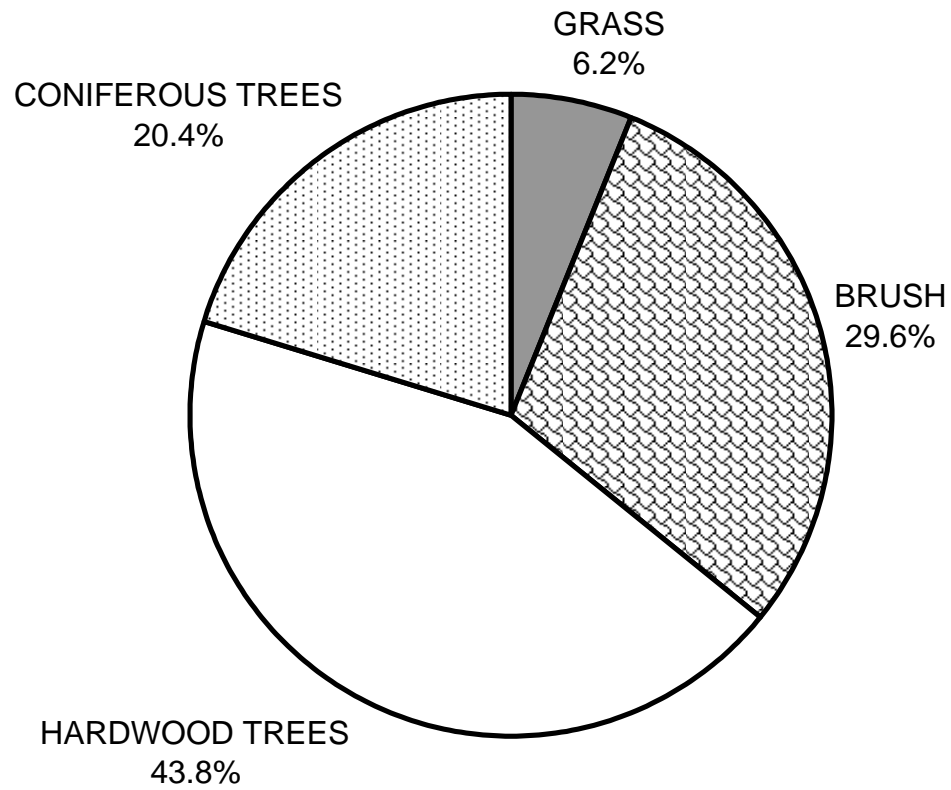
GRAPH 9

**GRAY CREEK 2011
DOMINANT BANK COMPOSITION IN SURVEY REACH**



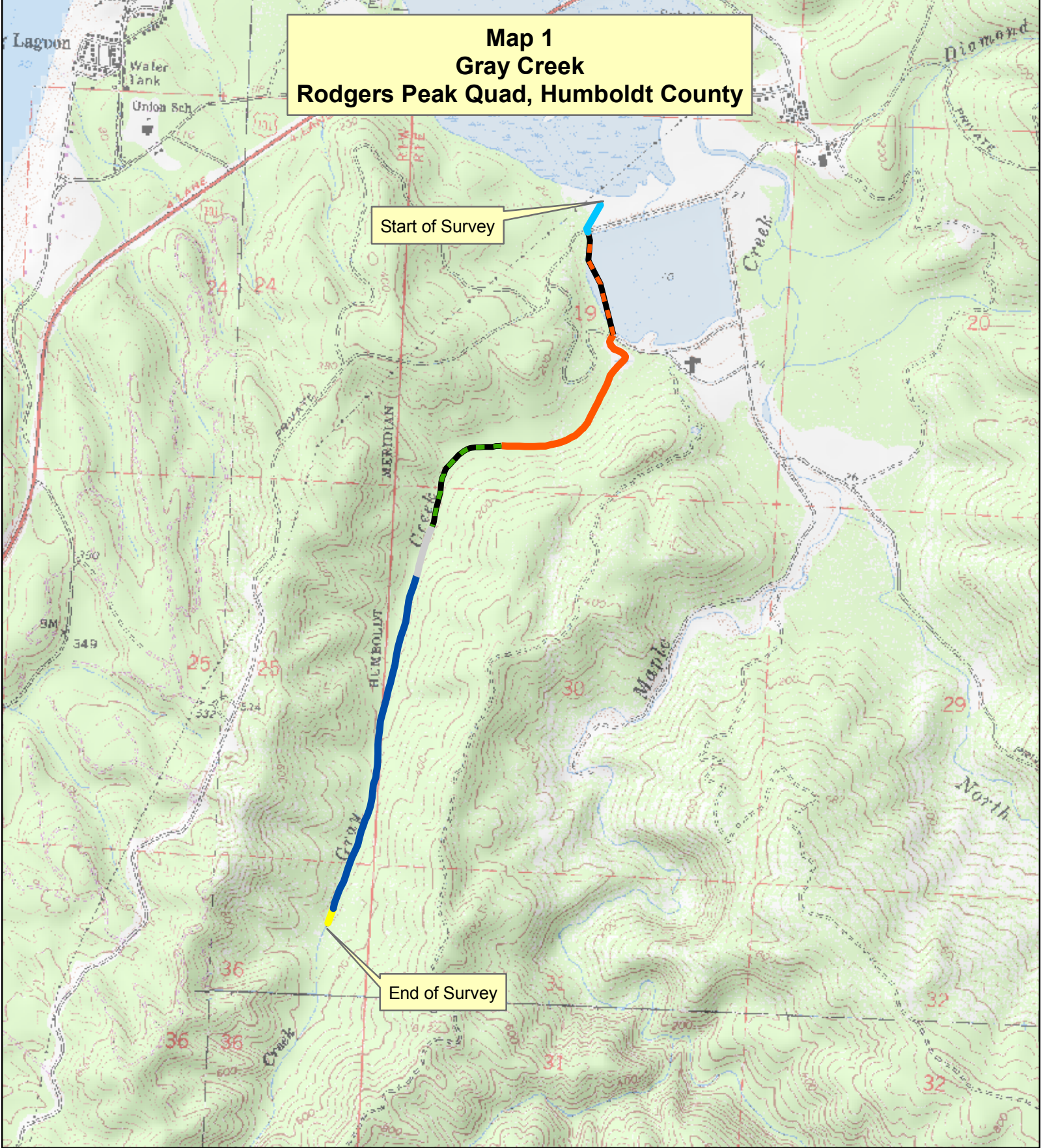
GRAPH 10

GRAY CREEK 2011 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1 Gray Creek Rodgers Peak Quad, Humboldt County



Start of Survey

End of Survey

Legend

- █ Reach 1, C6 Channel Type
- █ Reach 2, Unsurveyed (pond)
- █ Reach 3, Unsurveyed (marsh)
- █ Reach 4, E5 Channel Type
- █ Reach 5, Unserved
- █ Reach 6, G5 Channel Type
- █ Reach 7, A4 Channel Type

