STREAM INVENTORY REPORT

Little North Fork Navarro River

INTRODUCTION

A stream inventory was conducted from June 5 to July 17, 2012 on Little North Fork Navarro River. The survey began at the confluence with North Branch North Fork Navarro River and extended upstream 6.9 miles.

The Little North Fork Navarro River 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 Little North Fork Navarro River. 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

Little North Fork Navarro River is a tributary to North Branch North Fork Navarro River, tributary to North Fork Navarro River, tributary the Navarro River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Little North Fork Navarro River's legal description at the confluence with North Branch North Fork Navarro River is T16N R15W S33. Its location is 39.2073 degrees north latitude and 123.5365 degrees west longitude, LLID number 1235351392073. Little North Fork Navarro River is a third order stream and has approximately six miles of blue line stream according to the USGS Navarro 7.5 minute quadrangle. Little North Fork Navarro River drains a watershed of approximately 11.2 square miles. Elevations range from about 275 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and rural development. Vehicle access exists via Masonite Industrial Road.

METHODS

The habitat inventory conducted in Little North Fork Navarro River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (DFW). 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.

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

7. Substrate Composition:

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

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Little North Fork Navarro River, 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 Little North Fork Navarro River, 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.

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 Little North Fork Navarro River. In addition, underwater observations were made at sixteen sites using techniques 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 Wildlife. 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 Little North Fork Navarro River 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

HABITAT INVENTORY RESULTS

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

The habitat inventory of June 5 to July 17, 2012 was conducted by A. Garcia, M. Zee, R. Spencer, and C. Tiffany (WSP). The total length of the stream surveyed was 36,498 feet with an additional 922 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.92 cfs on June 18, 2012.

Little North Fork Navarro River is an F4 channel type for 24,018 feet of the stream surveyed (Reach 1), a B4 channel type for 5,999 feet of the stream surveyed (Reach 2), and a G4 channel type for 7,403 feet of the stream surveyed (Reach 3). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 50 to 59 degrees Fahrenheit. Air temperatures ranged from 47 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% pool units, 31% riffle units, 30% flatwater units, and 4% dry units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 30% pool units, 24% riffle units, and 3% dry units (Graph 2).

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Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 29%; mid-channel pool units, 18%; and step run units, 18% (Graph 3). Based on percent total length, step run units made up 34%, low gradient riffle units 23%, and log enhanced scour pool units 15%.

A total of 289 pools were identified (Table 3). Main channel pools were the most frequently encountered at 53% (Graph 4), and comprised 42% 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. Twenty-nine of the 289 pools (10%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 289 pool tail-outs measured, 64 had a value of 1 (22.1%); 205 had a value of 2 (70.9%); 20 had a value of 3 (6.9%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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 6, flatwater habitat types had a mean shelter rating of 6, and pool habitats had a mean shelter rating of 23 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 31. Main channel pools had a mean shelter rating of 17 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Little North Fork Navarro River. Graph 7 describes the pool cover in Little North Fork Navarro River. Large woody debris is the dominant pool cover type followed by small 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 77% 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 Little North Fork Navarro River was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 43% and 57%, respectively. Graph 9 describes the mean percent canopy in Little North Fork Navarro River.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 83% sand/silt/clay, 11% cobble/gravel, and 6% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 55% of the units surveyed. Additionally, 41% of the units surveyed had deciduous trees as the dominant vegetation type, and 3% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at sixteen sites for species composition and distribution in Little North Fork Navarro River on July 30, July 31, and August 21, 2012. The sites were sampled by I. Mikus and M. Groff (DFW).

In Reach 1, which comprised the first 24,018 feet of stream, seven sites were sampled. The reach sites yielded three young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), four age 1+ SH/RT, and 22 YOY coho salmon.

In Reach 2, nine sites were sampled starting approximately 23,427 from the confluence with North Branch North Fork Navarro River and continuing upstream 3,950 feet. The reach sites yielded two age 1+ SH/RT, six YOY coho salmon, and three sculpin.

The following chart displays the information yielded from these sites:

2012 Little North Fork Navarro River underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: F4 Channel Type									
08/21/12	1	006	Pool	305	1	2	0	4	0
	2	326	Pool	22,043	1	0	0	0	0
	3	331	Pool	22,228	1	0	0	4	0
	4	335	Pool	22,366	0	0	0	0	0
	5	337	Pool	22,413	0	1	0	4	0
	6	342	Pool	22,567	0	1	0	4	0
	7	367	Pool	23,315	0	0	0	6	0
Reach 2: B4 Channel Type									
	8	370	Pool	23,427	0	0	0	6	0
	9	373	Pool	23,595	0	0	0	0	0
	10	377	Pool	23,837	0	0	0	0	0
	11	380	Pool	23,942	0	0	0	0	0
	12	431	Pool	25,688	0	0	0	0	0
	13	433	Pool	25,794	0	1	0	0	0
	14	462	Pool	26,794	0	0	0	0	0
	15	478	Pool	27,311	0	0	0	0	0
	16	482	Pool	27,377	0	1	0	0	0

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DISCUSSION

Little North Fork Navarro River is an F4 channel type for the first 24,018 feet of stream surveyed, a B4 channel type for the next 5,999 feet, and a G4 channel type for the remaining 7,403 feet. The suitability of F4, B4, and G4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 5 to July 17, 2012 ranged from 50 to 59 degrees Fahrenheit. Air temperatures ranged from 47 to 72 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 43% of the total length of this survey, riffles 24%, and pools 30%. Twenty-nine of the 289 (10%) pools had a maximum residual depth greater than three feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three 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 structures that will increase or deepen pool habitat is recommended.

Two hundred sixty-nine of the 289 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty 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.

Two hundred seventy-three of the 289 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 is 23. 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 large woody debris in Little North Fork Navarro River. Large woody debris is the dominant cover type in pools followed by small 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 94%. Reach 1 had a canopy density of 93%, Reach 2 had a canopy density of 96%, and Reach 3 had a canopy density of 96%. The percentage of right and left bank covered with vegetation was 93% and 94%, respectively.

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RECOMMENDATIONS

1) Little North Fork Navarro River should be managed as an anadromous, natural production stream.

2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.

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 North Branch North Fork Navarro River. The channel is an F4. Large woody debris is accumulating in the channel.
4996	0066.00	Tributary #01 enters on the left bank. It contributes less than 1% to Little North Fork Navarro River's flow. The water temperature of the tributary was 53 degrees Fahrenheit, the water temperature downstream of the tributary was 55 degrees Fahrenheit, and the water temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is approximately 30%. The tributary is not accessible to salmonids.
6706	0087.00	Dry tributary on right bank.
8899	0106.00	Dry tributary on right bank.
10500	0126.00	Dry tributary on right bank.
11463	0143.00	Masonite Road crosses the channel. The crossing is a 12.3' high x 18' wide x 130' long corrugated metal culvert with a concrete bottom. The slope of the culvert is less than one percent and there is no plunge at the outlet.

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11778	0146.00	Big Gulch (tributary #02) enters on the right bank. It contributes approximately 2% to Little North Fork Navarro River's flow. The water temperature of the tributary was 50 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 51 degrees Fahrenheit. For more information, see the 2012 Big Gulch Stream Habitat Inventory Report.
13101	0167.00	Redwood Creek (tributary #03) enters on the left bank. It contributes approximately 5% to Little North Fork Navarro River's flow. The water temperature of the tributary was 51 degrees Fahrenheit, the water temperature downstream of the tributary was 51 degrees Fahrenheit, and the water temperature upstream of the confluence was 52 degrees Fahrenheit. For more information, see the 2012 Redwood Creek Stream Habitat Inventory Report.
13869	0177.00	Tributary #04 enters on the right bank. It contributes less than 1% to Little North Fork Navarro River's flow. The water temperature of the tributary is 50 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 52 degrees Fahrenheit. The slope of the tributary is greater than 10%. The tributary not accessible to salmonids.
15178	0203.00	Tributary #05 enters on the left bank. It contributes less than 1% to Little North Fork Navarro River's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 10%. There is a 6' high plunge approximately 50' upstream from the mouth. Large wood structure.
17338	0238.00	A logging road crosses the channel. The crossing is a 14.2' wide x 51' long x 10.1' high railcar bridge.
21844	0321.00	A logging road crosses the channel. The crossing is a 13.5' wide x 49' long x 14.3' high railcar bridge.
21951	0323.00	Bottom Creek (tributary #06) enters on the right bank. It contributes approximately 50% to Little North Fork Navarro River's flow. The water temperature of the tributary was 56 degrees Fahrenheit, the water temperature downstream of the tributary was 56 degrees Fahrenheit, and the water temperature upstream of the confluence was 57 degrees Fahrenheit. For more information, see the 2012 Bottom Creek Stream Habitat Inventory Report.
21978	0324.00	There is a 2.5' high plunge over a log.
22443	0339.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 5' high x 29' wide x 8' long. Water

		flows through the LDA and there are visible gaps in it. Retained sediment ranges from gravel to cobble and measures 18' wide x 60' long x 3.5' deep. Fish are present above the LDA.
22955	0358.00	Small woody debris (SWD) accumulation retaining sediment.
23360	0369.00	The channel changes from an F4 to a B4.
25520	0430.00	Tributary #07 enters on the right bank. It contributes approximately 10% to Little North Fork Navarro River's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 53 degrees Fahrenheit. The slope of the tributary is approximately 10%. The tributary goes dry approximately 30' upstream from the mouth.
25821	0435.00	There is a 2' high plunge over rocks and SWD. LDA #02 contains four pieces of LWD and measures 6.5' high x 26.5' wide x 6' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble and measures 20' wide x 35' long x 3.5' deep. Fish are present above the LDA.
25917	0438.00	LDA #03 contains eight pieces of LWD and measures 6.5' high x 16' wide x 7.5' long. The flow is subsurface through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to gravel and measures 12' wide x 40' long x 3' deep. Fish are present above the LDA.
26339	0450.00	Left bank seep.
26475	0454.00	There is a 2' high plunge over log.
27311	0479.00	LDA #04 contains four pieces of LWD and measures 6.5' high x 39' wide x 7' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to cobble and measures 22' wide x 60' long x 5' deep. Fish are present above the LDA.
29359	0539.00	The channel changes from a B4 to a G4.
29490	0544.00	Tributary #08 enters on the left bank. It contributes approximately 5% to Little North Fork Navarro River's flow. The water temperature of the tributary is 55 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit. The slope of the tributary is approximately 5%. The tributary goes dry approximately 20' upstream from the mouth.
29599	0549.00	There is a 2' high plunge through SWD.

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29877	0560.00	There is a 3' high plunge through rootwad and SWD.
29924	0563.00	There is a 1.5' high plunge.
30191	0572.00	A landslide on the left bank is contributing sediment ranging in size from silt to cobble.
30718	0589.00	Dry left bank tributary.
31264	0610.00	LDA #05 contains seven pieces of LWD and measures 5' high x 29' wide x 9' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to cobble and measures 12' wide x 55' long x 4' deep. There is a 5' high plunge over the LDA and the flow is subsurface through it. Fish are present above the LDA.
31536	0623.00	Dry right bank tributary. LDA #06 contains 18 pieces of LWD and measures 6' high x 20' wide x 20' long. The flow is subsurface through the LDA and the channel is dry for 50' above it. There are visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 13' wide x 40' long x 2' deep. There is a 2' high plunge over the LDA. Fish are present above the LDA.
32244	0641.00	LDA #07 contains six pieces of LWD and measures 7.5' high x 40' wide x 10' long. Water does not flow through the LDA; the channel is dry for 20' above it. There are no visible gaps in it. Retained sediment ranges from silt to cobble and measures 40' wide x 60' long x 3.5' deep. There is a 2' high plunge over the LDA. Fish are present above the LDA.
32771	0666.00	LDA #08 contains one piece of LWD and measures 5' high x 10' wide x 30' long. The flow is subsurface through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to gravel and measures 5' wide x 40' long x 4' deep. There is a 5' high plunge over the LDA. No fish were observed above the LDA.
33073	0678.00	Tributary #09 enters on the left bank. It contributes less than 5% to Little North Fork Navarro River's flow. The water temperature of the tributary was 52 degrees Fahrenheit, the water temperature downstream of the tributary was 54 degrees Fahrenheit, and the water temperature upstream of the confluence was 52 degrees Fahrenheit. The slope of the tributary is approximately 2%. The tributary goes dry approximately 80' upstream from the mouth.
34718	0735.00	LDA #09 contains three pieces of LWD and measures 5' high x 7' wide x 12' long. The flow is subsurface through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to cobble and measures 7' wide x 40' long x 4' deep.

35288	0752.00	LDA #10 contains two pieces of LWD and measures 8' high x 7' wide x 9' long. The channel is dry above the LDA and there are no visible gaps in it. Retained sediment ranges from sand to gravel and measures 4' wide x 100' long x 8' deep. There is a 7' high plunge over the LDA.
35833	0767.00	LDA #11 contains six pieces of LWD and measures 5' high x 12' wide x 4' long. The flow is subsurface through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to gravel and measures 8' wide x 3' deep.
36135	0774.00	There is a 2' high plunge.
36482	0786.00	End of survey due to diminished habitat. No fish were observed above habitat unit #752.

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: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0

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	0.1	184	184	0.5									
29	0	DRY	3.6	37	1061	2.8									
241	45	FLATWATER	29.8	66	15917	42.5	7.5	0.5	1.0	806	194348	453	109140		6
2	0	NOSURVEY	0.2	14	27	0.1									
289	289	POOL	35.7	39	11299	30.2	11.1	0.8	1.8	495	143062	586	169267	477	23
247	36	RIFFLE	30.5	36	8932	23.9	8.3	0.3	0.6	241	59609	71	17591		6

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
809	370	37420	397019	295997

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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 (%)
236	32	LGR	29.2	36	8592	23.0	9	0.3	1.4	261	61637	77	18241		6	95
11	4	HGR	1.4	31	340	0.9	4	0.3	0.7	83	908	23	249		6	96
94	18	RUN	11.6	36	3353	9.0	6	0.5	1.6	213	20061	126	11858		5	95
147	27	SRN	18.2	85	12564	33.6	8	0.5	2.1	1202	176659	671	98589		6	94
149	149	MCP	18.4	31	4615	12.3	9	0.6	3.7	307	45794	322	47953	260	17	94
1	1	CCP	0.1	16	16	0.0	8	0.5	1	128	128	77	77	64	0	76
3	3	STP	0.4	31	94	0.3	8	0.8	2	277	832	336	1008	302	8	90
106	106	LSL	13.1	53	5566	14.9	14	0.9	4	784	83139	987	104659	810	32	95
6	6	LSR	0.7	38	230	0.6	16	0.8	3	611	3669	592	3552	464	42	91
7	7	LSBk	0.9	57	400	1.1	12	1.1	3.9	704	4928	974	6818	807	19	91
4	4	LSBo	0.5	34	134	0.4	13	1.0	2.2	454	1817	658	2632	512	49	95
13	13	PLP	1.6	19	244	0.7	11	0.8	3.1	212	2756	197	2567	175	18	95
29	0	DRY	3.6	37	1061	2.8										98
1	0	CUL	0.1	184	184	0.5										
2	0	NS	0.2	14	27	0.1										89

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
809	370	37420	402328	298203

Table 3 - Summary of Pool Types

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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
153	153	MAIN	53	31	4725	42	8.8	0.7	306	46754	259	39638	17
136	136	SCOUR	47	48	6574	58	13.7	0.9	708	96308	724	97767	31

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
289	289	11299	143061	137406

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

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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
149	MCP	52	21	14	101	68	24	16	3	2	0	0
1	CCP	0	0	0	1	100	0	0	0	0	0	0
3	STP	1	0	0	2	67	1	33	0	0	0	0
106	LSL	37	3	3	39	37	43	41	20	19	1	1
6	LSR	2	0	0	4	67	1	17	1	17	0	0
7	LSBk	2	0	0	2	29	3	43	2	29	0	0
4	LSBo	1	0	0	2	50	2	50	0	0	0	0
13	PLP	4	3	23	5	38	3	23	2	15	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
289	27	9	156	54	77	27	28	10	1	0

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012 Dry Units: 29

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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
236	32	LGR	0	24	9	11	18	0	9	29	0
11	4	HGR	0	18	45	0	3	0	0	35	0
247	36	TOTAL RIFFLE	0	22	17	9	14	0	7	31	0
94	18	RUN	4	21	43	12	8	0	0	11	1
147	27	SRN	5	15	34	11	4	0	0	31	0
241	45	TOTAL FLAT	5	17	37	12	5	0	0	24	0
149	149	MCP	19	25	25	12	5	4	0	7	2
1	1	CCP	0	0	0	0	0	0	0	0	0
3	3	STP	30	7	55	7	0	0	0	0	0
106	106	LSL	10	24	45	9	3	1	0	6	2
6	6	LSR	4	13	12	68	2	0	0	0	0
7	7	LSBk	0	13	13	0	4	17	1	30	22
4	4	LSBo	0	11	9	9	3	16	0	31	21
13	13	PLP	6	11	52	29	1	0	1	1	0
289	289	TOTAL POOL	14	23	34	13	4	3	0	7	3
1	0	CUL									
2	0	NS									
809	370	TOTAL	13	23	34	12	4	3	0	9	2

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012 Dry Units: 29

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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
236	32	LGR	3	0	94	3	0	0	0
11	4	HGR	0	0	100	0	0	0	0
94	18	RUN	6	11	83	0	0	0	0
147	27	SRN	0	0	100	0	0	0	0
149	149	MCP	7	0	93	0	0	0	0
1	1	CCP	0	0	100	0	0	0	0
3	3	STP	0	0	100	0	0	0	0
106	106	LSL	2	8	88	1	0	0	1
6	6	LSR	0	0	100	0	0	0	0
7	7	LSBk	0	0	100	0	0	0	0
4	4	LSBo	0	25	75	0	0	0	0
13	13	PLP	31	0	69	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	57	43	0	93	94

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: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012 Survey Length (ft.): 37420 Main Channel (ft.): 36498 Side Channel (ft.): 922

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 23360
Riffle/Flatwater Mean Width (ft.): 10.2
BFW:
Range (ft.): 13 to 32
Mean (ft.): 22
Std. Dev.: 5
Base Flow (cfs.): 0.9
Water (F): 51 - 59 Air (F): 47 - 72
Dry Channel (ft): 398

Canopy Density (%): 92.8
Coniferous Component (%): 60.5
Hardwood Component (%): 39.5
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 94.1
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 27
LWD per 100 ft.:
Riffles: 1
Pools: 5
Flat: 2

Pools by Stream Length (%): 32.6
Pool Frequency (%): 37.2
Residual Pool Depth (%):
< 2 Feet Deep: 37
2 to 2.9 Feet Deep: 46
3 to 3.9 Feet Deep: 16
>= 4 Feet Deep: 1
Mean Max Residual Pool Depth (ft.): 2.2
Mean Pool Shelter Rating: 31

Pool Tail Substrate (%): Silt/Clay: 1 Sand: 1 Gravel: 77 Sm Cobble: 17 Lg Cobble: 4 Boulder: 1 Bedrock: 0

Embeddedness Values (%): 1. 29.1 2. 70.2 3. 0.7 4. 0.0 5. 0.0

STREAM REACH: 2

Channel Type: B4
Reach Length (ft.): 5999
Riffle/Flatwater Mean Width (ft.): 6.2
BFW:
Range (ft.): 11 to 25
Mean (ft.): 18
Std. Dev.: 3
Base Flow (cfs.): 0.9
Water (F): 53 - 59 Air (F): 50 - 72
Dry Channel (ft): 0

Canopy Density (%): 96.2
Coniferous Component (%): 53.7
Hardwood Component (%): 46.3
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 92.6
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 24
LWD per 100 ft.:
Riffles: 1
Pools: 6
Flat: 3

Pools by Stream Length (%): 34.6
Pool Frequency (%): 38.8
Residual Pool Depth (%):
< 2 Feet Deep: 80
2 to 2.9 Feet Deep: 12
3 to 3.9 Feet Deep: 8
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 24

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 80 Sm Cobble: 18 Lg Cobble: 2 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 1.5 2. 90.9 3. 7.6 4. 0.0 5. 0.0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: G4

Reach Length (ft.): 7139

Riffle/Flatwater Mean Width (ft.): 4.3

BFW:

Range (ft.): 5 to 23

Mean (ft.): 12

Std. Dev.: 5

Base Flow (cfs.): 0.9

Water (F): 50 - 58 Air (F): 55 - 70

Dry Channel (ft): 663

Canopy Density (%): 96.0

Coniferous Component (%): 51.6

Hardwood Component (%): 48.4

Dominant Bank Vegetation: Coniferous Trees

Vegetative Cover (%): 92.6

Dominant Shelter: Large Woody Debris

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 19

LWD per 100 ft.:

Riffles: 2

Pools: 10

Flat: 4

Pools by Stream Length (%): 18.8

Pool Frequency (%): 31.5

Residual Pool Depth (%):

< 2 Feet Deep: 95

2 to 2.9 Feet Deep: 5

3 to 3.9 Feet Deep: 0

>= 4 Feet Deep: 0

Mean Max Residual Pool Depth (ft.): 1.2

Mean Pool Shelter Rating: 9

Pool Tail Substrate (%): Silt/Clay: 5 Sand: 1 Gravel: 74 Sm Cobble: 18 Lg Cobble: 1 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 26.8 2. 56.1 3. 17.1 4. 0.0 5. 0.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

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	19	25	5.9
Boulder	1	0	0.1
Cobble / Gravel	42	41	11.2
Sand / Silt / Clay	308	304	82.7

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	1	0	0.1
Brush	17	8	3.4
Hardwood Trees	160	146	41.4
Coniferous Trees	192	216	55.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

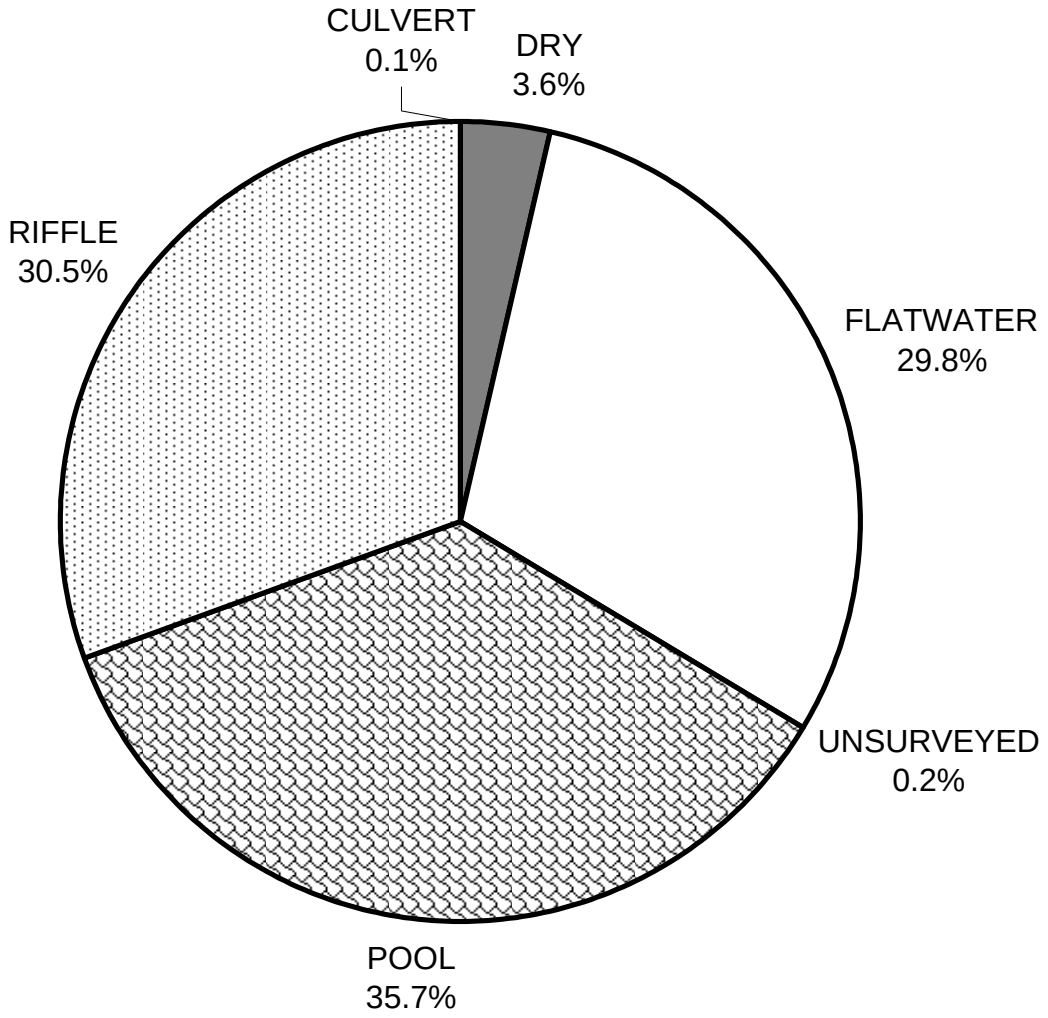
StreamName: Little North Fork Navarro River LLID: 1235351392073 Drainage: Navarro River

Survey Dates: 6/5/2012 to 7/17/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS33 Latitude: 39:12:26.0N Longitude: 123:32:06.0W

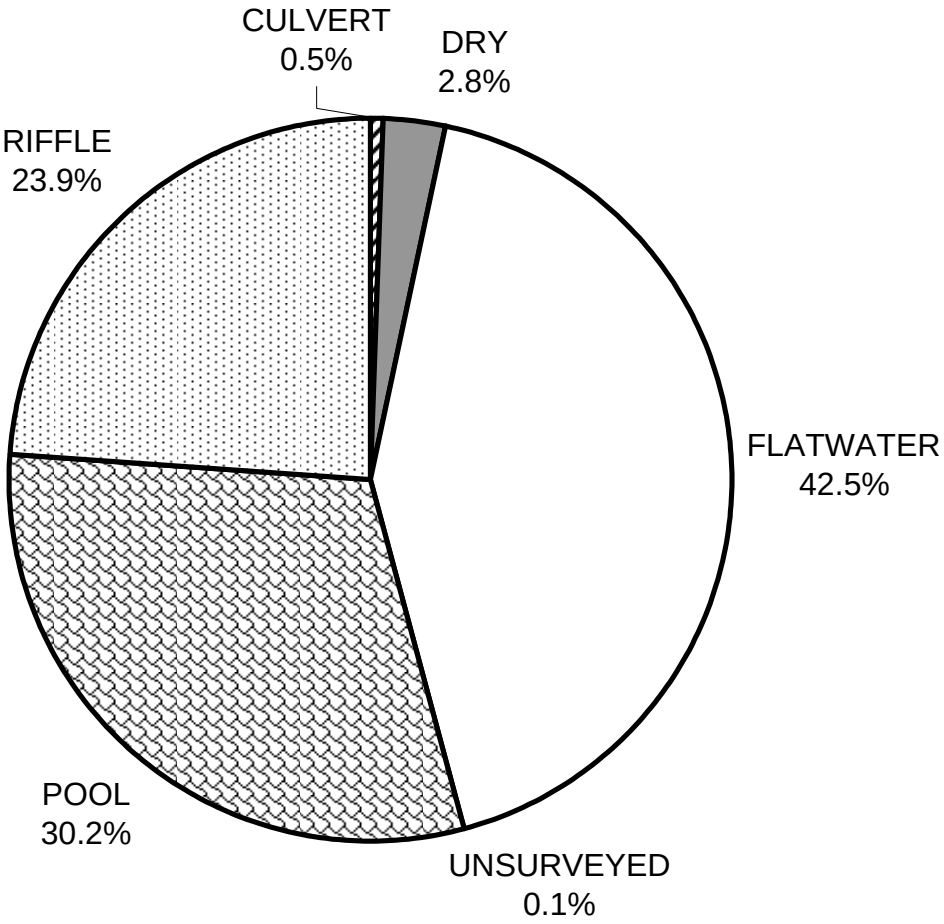
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	5	14
SMALL WOODY DEBRIS (%)	22	17	23
LARGE WOODY DEBRIS (%)	17	37	34
ROOT MASS (%)	9	12	13
TERRESTRIAL VEGETATION (%)	14	5	4
AQUATIC VEGETATION (%)	0	0	3
WHITEWATER (%)	7	0	0
BOULDERS (%)	31	24	7
BEDROCK LEDGES (%)	0	0	3

LITTLE NORTH FORK NAVARRO RIVER 2012
HABITAT TYPES BY PERCENT OCCURRENCE



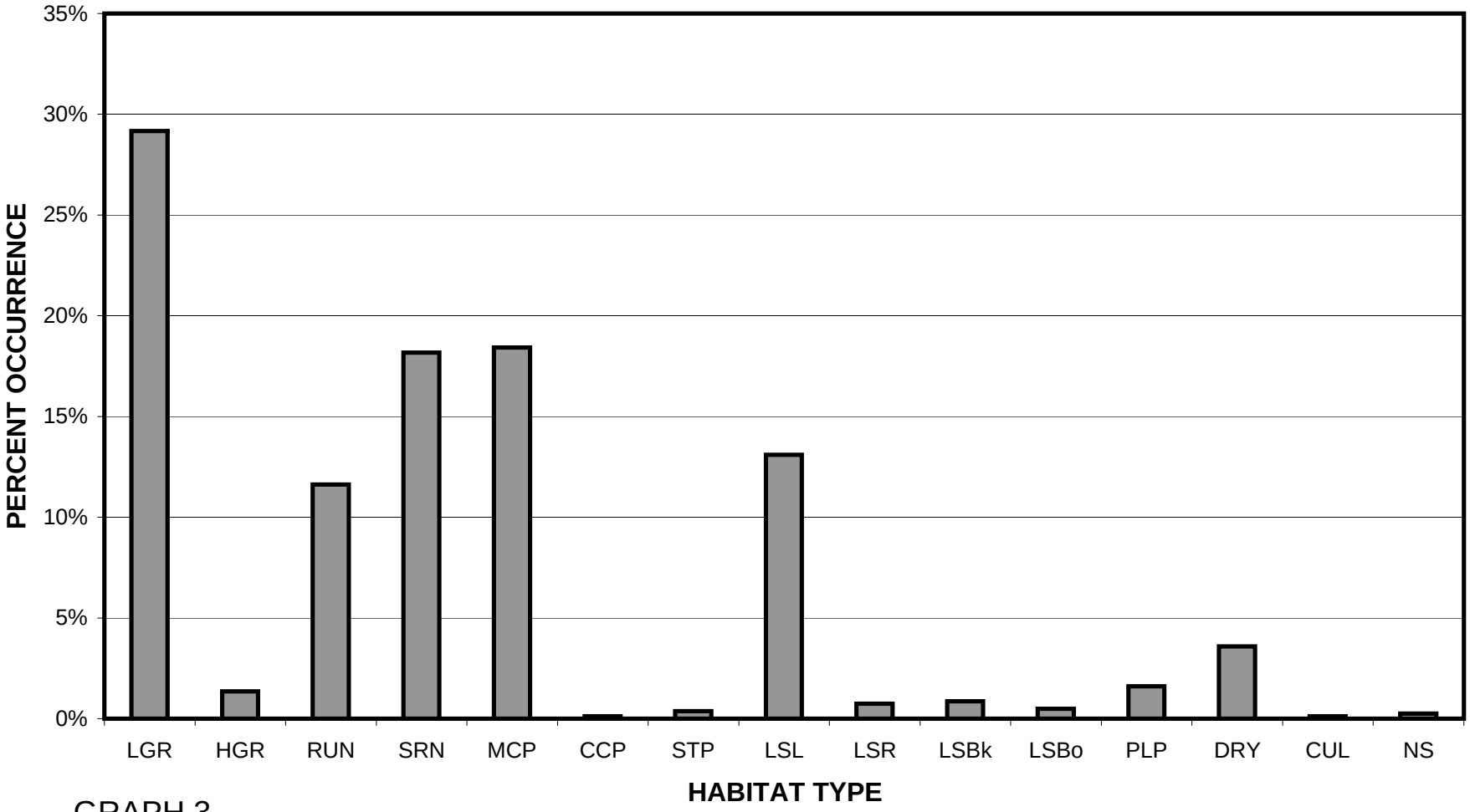
GRAPH 1

LITTLE NORTH FORK NAVARRO RIVER 2012
HABITAT TYPES BY PERCENT TOTAL LENGTH



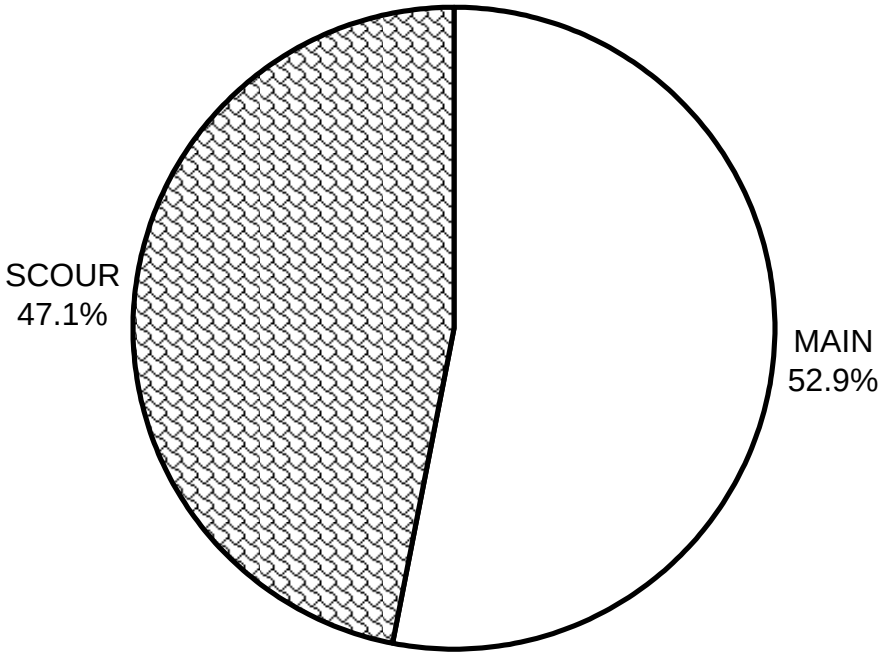
GRAPH 2

LITTLE NORTH FORK NAVARRO RIVER 2012
HABITAT TYPES BY PERCENT OCCURRENCE



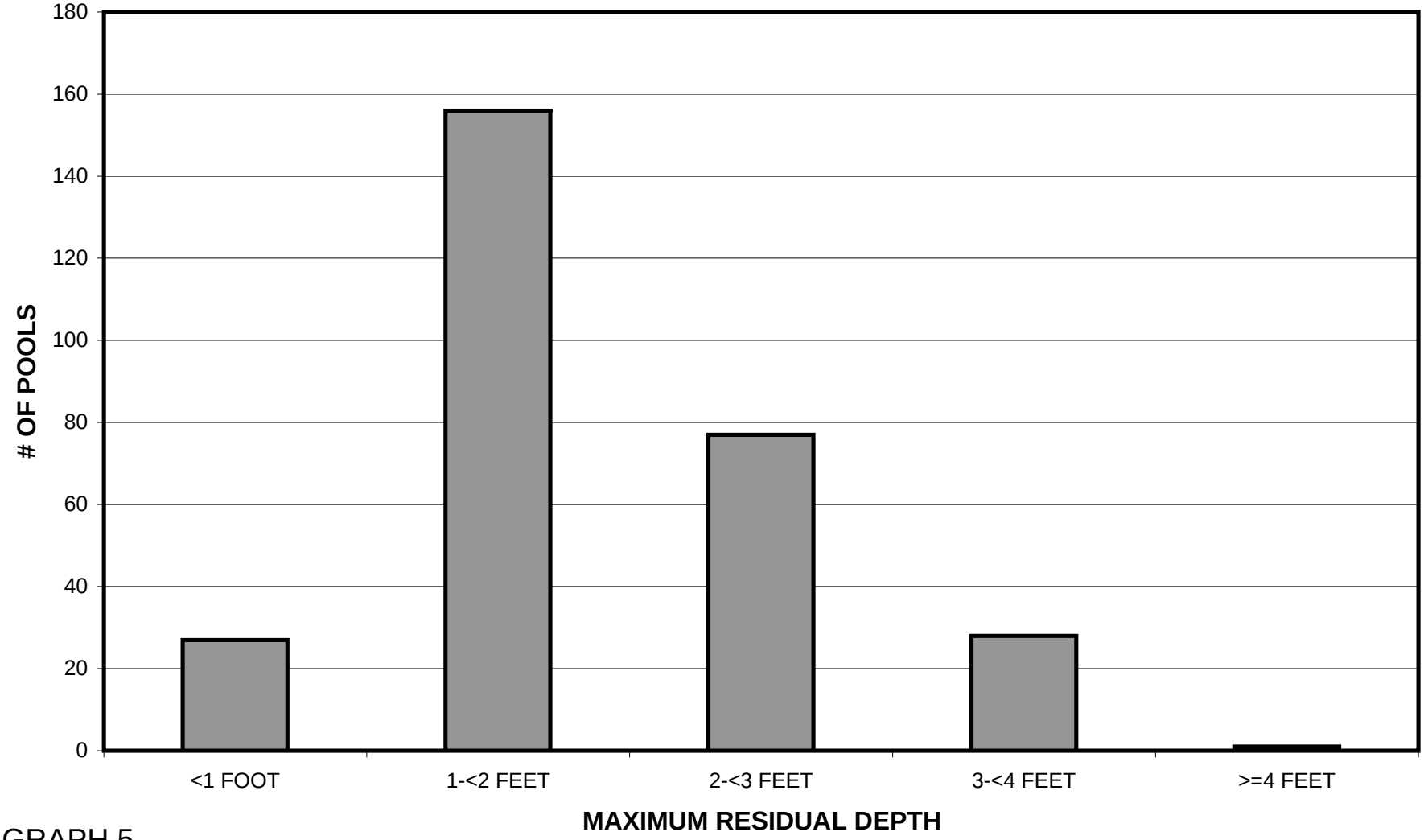
GRAPH 3

LITTLE NORTH FORK NAVARRO RIVER 2012
POOL TYPES BY PERCENT OCCURRENCE



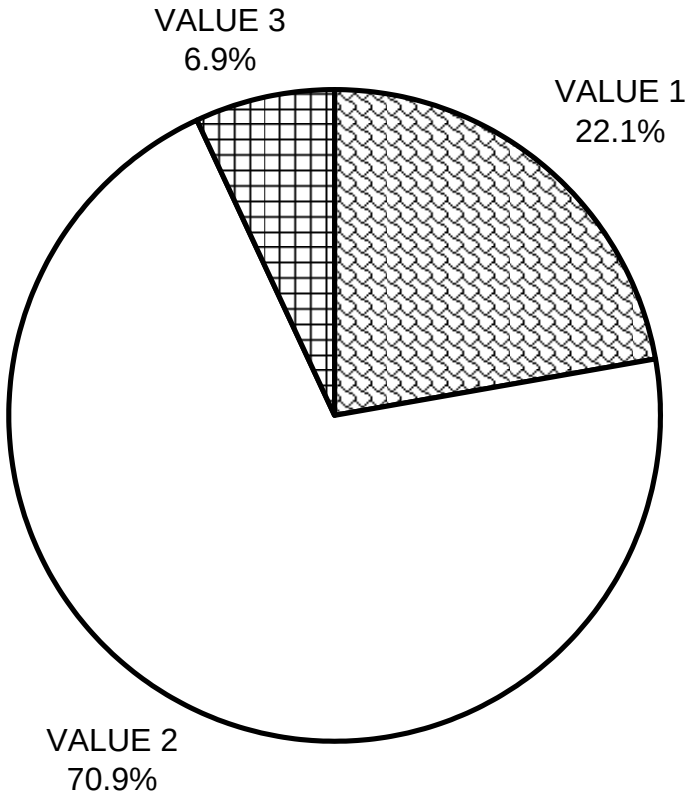
GRAPH 4

LITTLE NORTH FORK NAVARRO RIVER 2012
MAXIMUM DEPTH IN POOLS



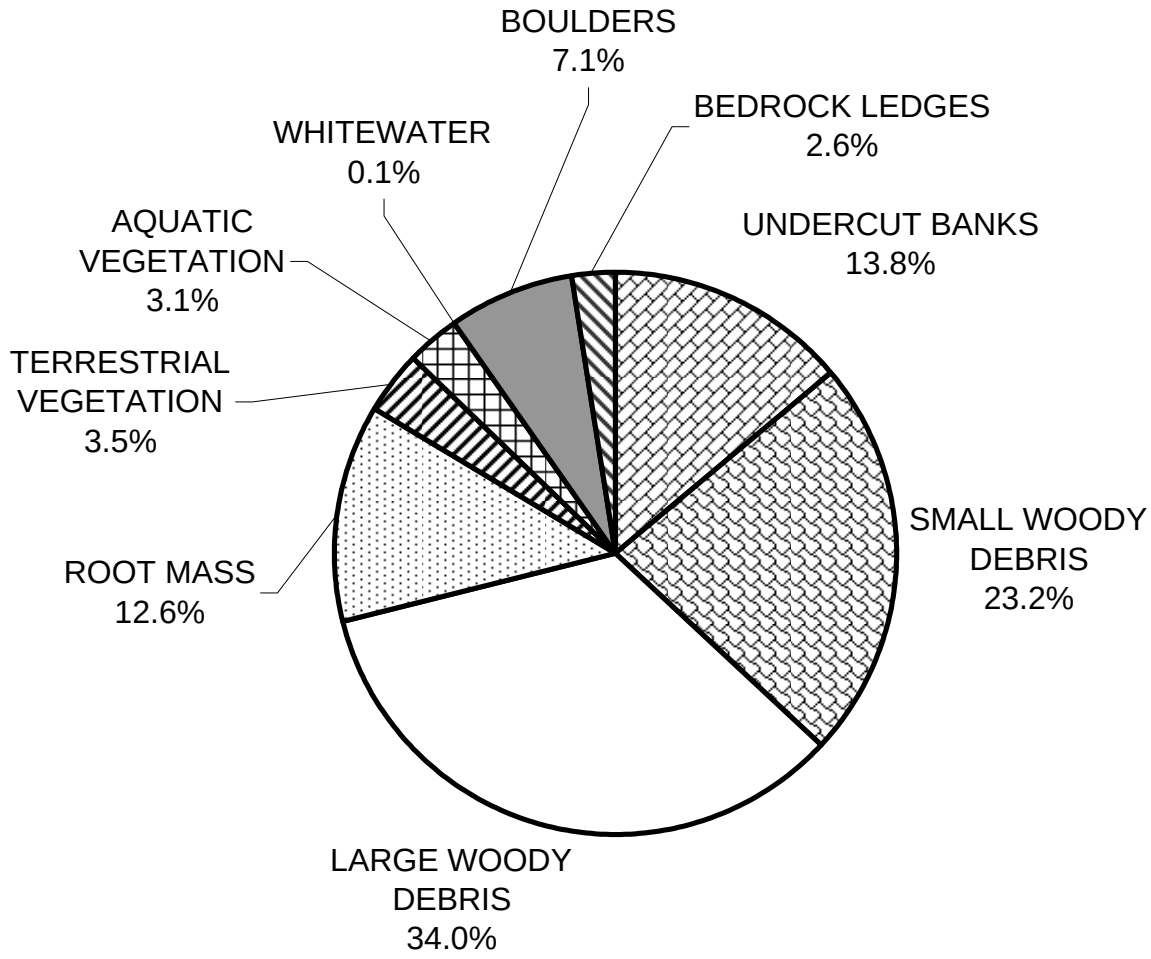
GRAPH 5

LITTLE NORTH FORK NAVARRO RIVER 2012
PERCENT EMBEDDEDNESS



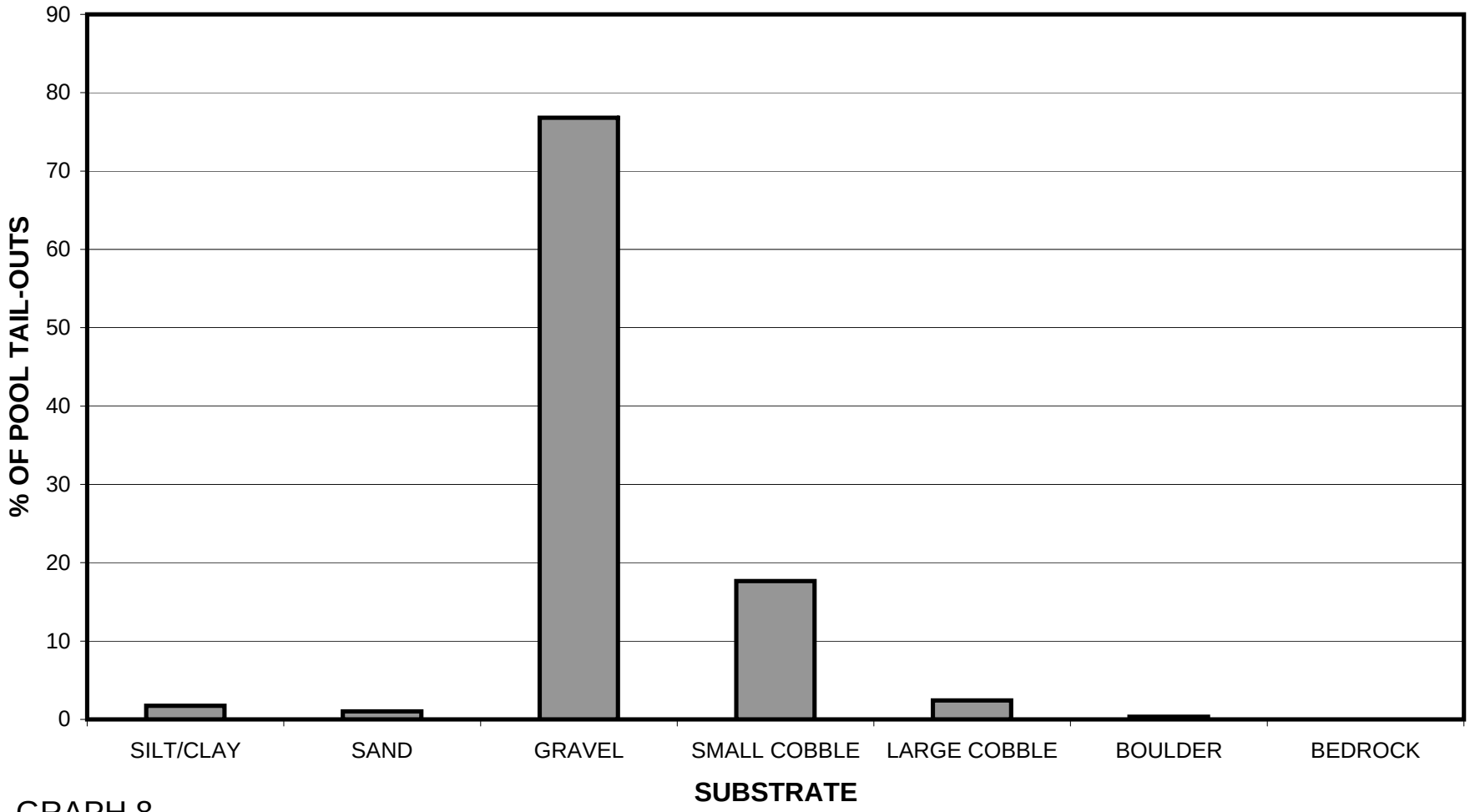
GRAPH 6

LITTLE NORTH FORK NAVARRO RIVER 2012
MEAN PERCENT COVER TYPES IN POOLS



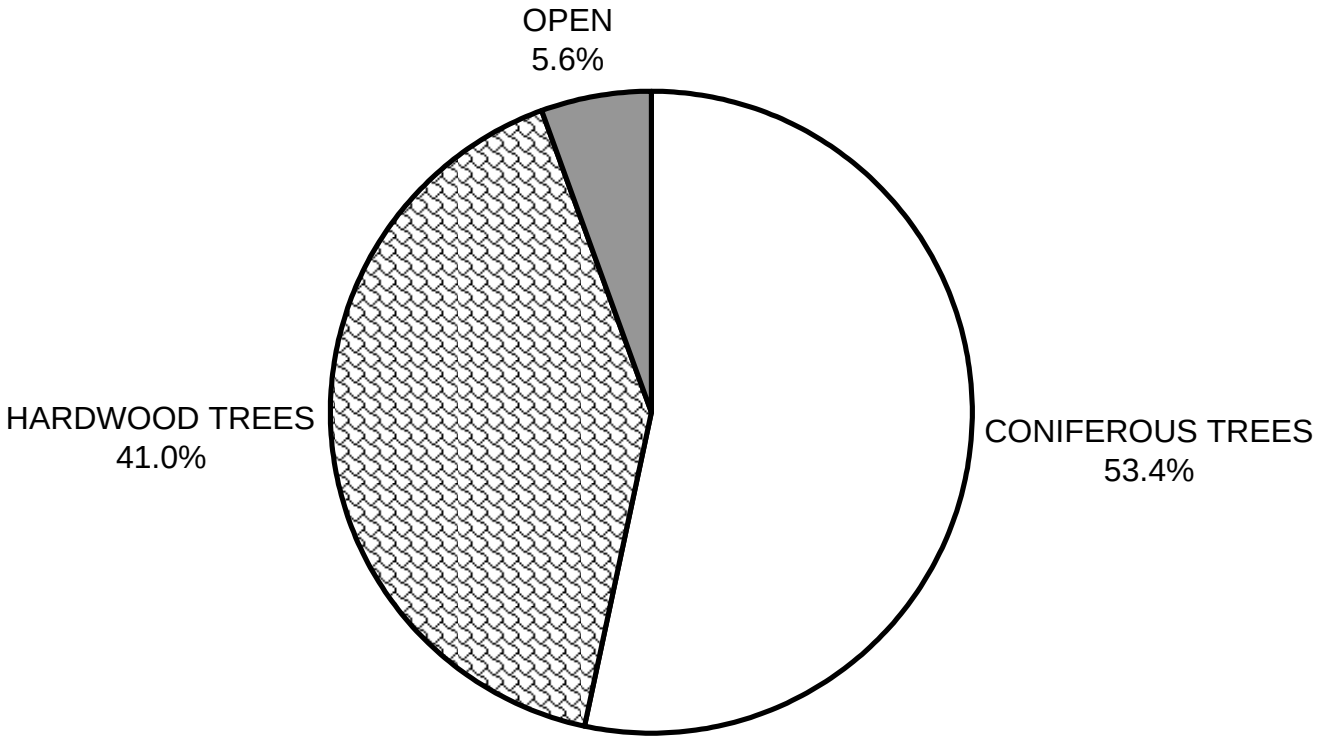
GRAPH 7

LITTLE NORTH FORK NAVARRO RIVER 2012
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



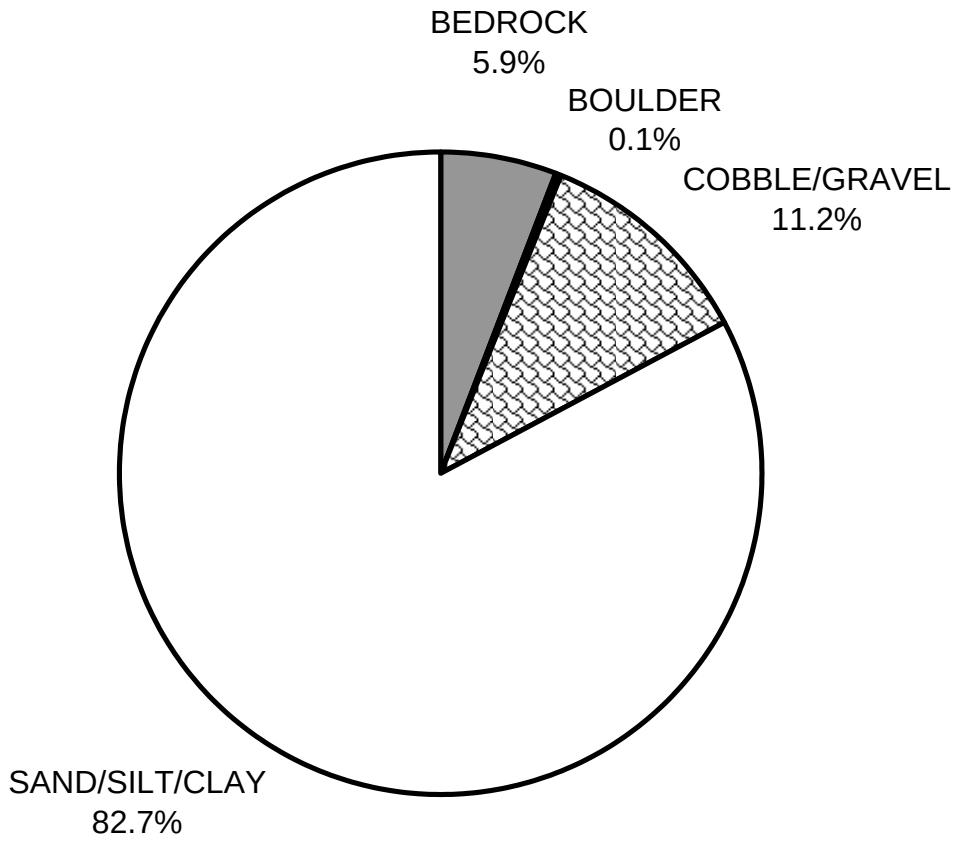
GRAPH 8

LITTLE NORTH FORK NAVARRO RIVER 2012
MEAN PERCENT CANOPY



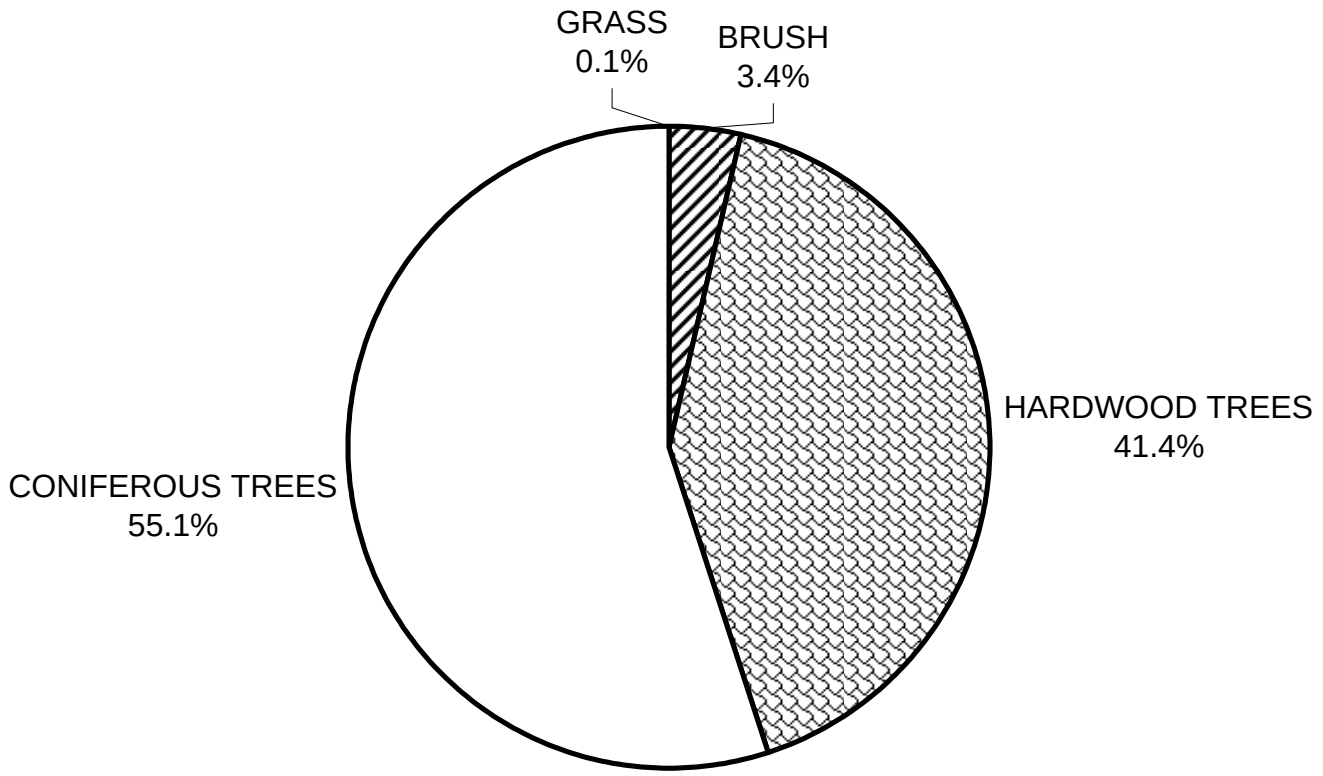
GRAPH 9

LITTLE NORTH FORK NAVARRO RIVER 2012
DOMINANT BANK COMPOSITION IN SURVEY REACH

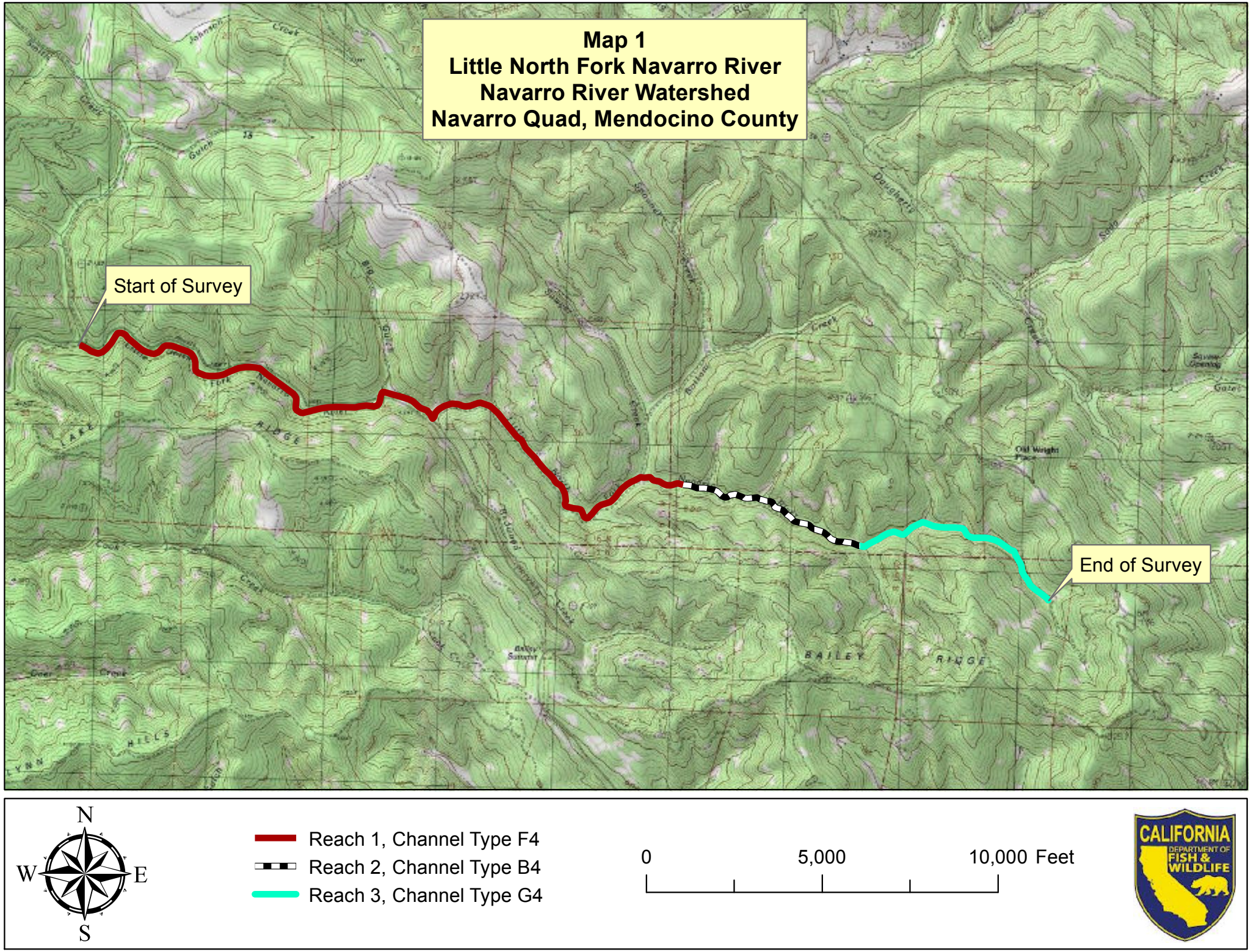


GRAPH 10

LITTLE NORTH FORK NAVARRO RIVER 2012
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11


Map 1
Little North Fork Navarro River
Navarro River Watershed
Navarro Quad, Mendocino County
Start of Survey
End of Survey
Reach 1, Channel Type F4
Reach 2, Channel Type B4
Reach 3, Channel Type G4
0
5,000
10,000 Feet
N
W
E
S
CALIFORNIA
DEPARTMENT OF
FISH & WILDLIFE