CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Duncan Creek
Report revised April 14, 2006
Report Completed 2005
Assessment Completed 2001

INTRODUCTION

A stream inventory was conducted July 7, 2001 on Duncan Creek. The survey began at the confluence with Feliz Creek and extended upstream 14,657 feet.

The Duncan 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 Duncan 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, 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

Duncan Creek is a tributary to Feliz Creek, a tributary to the Russian River, a tributary to the Pacific Ocean located in Mendocino County, California (Map 1). Duncan Creek's legal description at the confluence with Feliz Creek is T13N R12W S23. Its location is 38.9714872176368° north latitude and 123.139854533312° west longitude. Duncan Creek is an ephemeral stream according to the USGS Yorkville 7.5 minute quadrangle. Duncan Creek drains a watershed of approximately 8.67 square miles. Elevations range from about 512 feet at the mouth of the creek to 3,166 feet in the headwater areas. Hardwood forest dominates the watershed. The watershed is entirely privately owned. Steelhead trout (*Oncorhynchus mykiss*) are a threatened salmonid species present in the Duncan Creek watershed. Vehicle access exists via Highway 101 to Feliz Creek Road, approximately 0.21 miles south of the town of Hopland. Follow Feliz Creek Road west approximately 1.6 miles to a bridge crossing Feliz Creek. By foot follow Feliz Creek 480 feet to the confluence with Duncan Creek.

METHODS

The habitat inventory conducted in Duncan Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The California Department of Fish and Game field crew that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail

crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

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

1. Flow:

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

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

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

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Duncan 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 Duncan Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size,

bedrock, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Duncan Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were visually 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 Duncan 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 visually into percentages of evergreen or deciduous trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Duncan 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.

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 Duncan Creek. In addition, one site was electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

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

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

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

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 7, 2001, was conducted by Justin Smith and Corey Sangiacomo (DFG). The total length of the stream surveyed was 14,657 feet.

Stream flow was not measured on Duncan Creek.

Duncan Creek is a B3 channel type for the entire 14,657 feet of the stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile, stable banks and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 62 to 70 degrees Fahrenheit. Air temperatures ranged from 64 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 45% riffle units, 11% flatwater units, 18% pool units, and 26% dry units (Graph 1). Based on total *length* of Level II habitat types there were 16% riffle units, 2% flatwater units, 1% pool units, and 81% dry units (Graph 2).

Four Level IV habitat types were identified (Table 2). The most frequent habitat types by

percent *occurrence* were low-gradient riffles, 45%; dry, 26%; mid-channel pools, 18%; and runs 11% (Graph 3). Based on percent total *length*, dry made up 81%, low-gradient riffles 16%, and runs 2%.

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

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Five of the seven measured pools (71%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the seven pool tail-outs measured, seven had a value of 1 (100%), (Graph 6). 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 unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders.

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 3, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 10 (Table 1). Of the pool types, the main-channel pools had the highest mean shelter rating at 10 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Small cobble was the dominant substrate observed in 85 % of pool tail-outs while gravel was the next most frequently observed substrate type, at 15%.

The mean percent canopy density for the surveyed length of Duncan Creek was 74%. The mean percentages of evergreen and deciduous trees were 56% and 18%, respectively. Twenty six percent of the canopy was open. Graph 9 describes the mean percent canopy in Duncan Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 50%. The mean percent left bank vegetated was 63%. The dominant elements composing the structure of the stream banks consisted of 25% bedrock, 58% boulder, 17% cobble/gravel, and 0% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 58% of the units surveyed. Additionally, 25% of the units surveyed had grass as the dominant vegetation type, 8% had brush and 9% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

On 10/18/01 a biological inventory was conducted at one site on Duncan Creek to document fish species composition and distribution. The site was between Lat. 38:57’06.8”, Long. 123:08’56.5”, and Lat. 38:57’01.0”, Long. 123:09’00.3”. Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 52-54ºF and the water temperature was 53ºF.

The inventory began at 09:31 hours in Reach 1 and ended at 10:11 hours 304’ upstream. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The

following table displays the information yielded from this site.

Species Observed	Numbers Recorded at Site 1
Steelhead Y+	4
Steelhead 2+	2
Yellow-legged Frog	2

There is no record of hatchery stocking or fish rescue/transfer operations in Duncan Creek.

DISCUSSION

Duncan Creek is a B3 channel type for the entire 14,657 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: B3 channel types are excellent for bank-placed boulders and good for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

The water temperatures recorded on July 17, 2001, were above the suitable range for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Riffle habitat types comprised 16% of the total length of this survey, flatwater 2%, and pools 1%. The pools are relatively deep, with five of the 7 (71%) measured pools having a maximum depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

All seven of the pool tail-outs measured had embeddedness ratings of 1 or 2. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Duncan Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

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

The mean shelter for flatwater was 0. The mean shelter rating for pools was 10. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, bedrock ledges contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce

density related competition.

The mean percent canopy density for the stream was 74%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 50% and 63%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

GENERAL RECOMMENDATIONS

Duncan Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

RECOMMENDATIONS

1. There are several reaches where the stream is being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.

2. Increase the canopy on Duncan Creek in Reach 1 by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

3. Duncan Creek would benefit from utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.

4. Increase woody cover in the pools and flatwater habitat units. Adding high quality complexity with woody cover is desirable.

5. Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

COMMENTS AND LANDMARKS

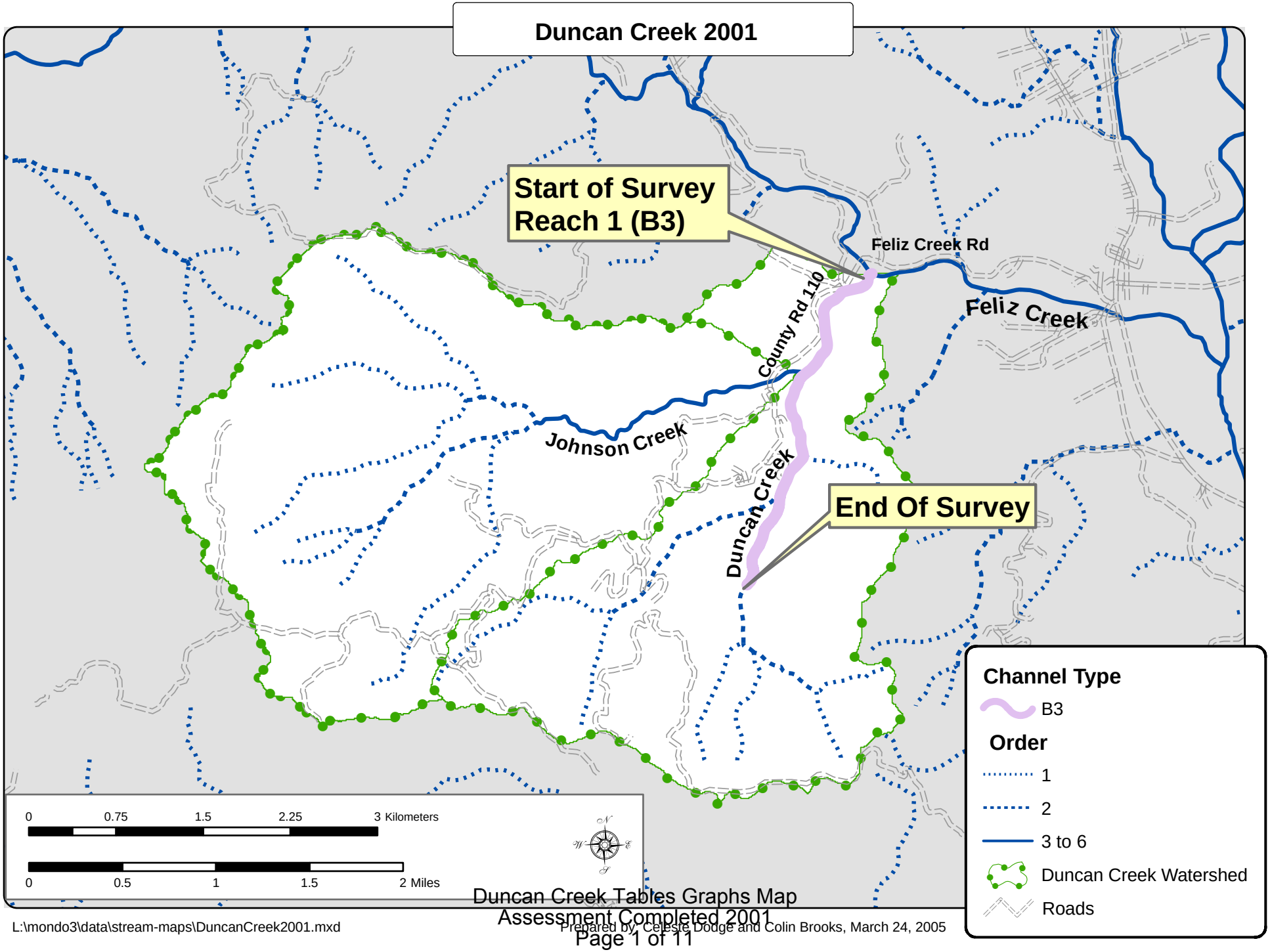
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey.

0' Begin survey at confluence with Feliz Creek

8715'	Dry Trib LB 200' in HU; Old summer dam unused 1700' in HU; Wet road crossing 1900' in HU & 2860
11677'	+/- 10 YOY/ 62 degree water
12496'	+/- 5 YOY; Dry Trib RB 300' in HU
13064'	>10 YOY/ 4 @ 1+/ 3 @ 2+
13081'	>50 YOY
14103'	3 YOY/ 2 @ 1+
14246'	1 @ 10" & 1 @ 8" Salmonids/ 68 degree water
14257'	7' Jump
14463'	1 @ 3" Turtle
14632'	END OF SURVEY-No fish seen above 14257'.

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.



Duncan Creek Tables Graphs Map
Assessment Completed 2001

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Prepared by: Celeste Dodge and Colin Brooks, March 24, 2005

Duncan Creek — Drainage: RUSSIAN RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 07/07/01

Confluence Location: QUAD: YORKVILLE LEGAL DESCRIPTION: T13NR12WS23 LATITUDE:38°58'17" LONGITUDE:123°8'23"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN 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
17	3	RIFFLE	45	140	2375	16	4.3	0.4	327	5551	128	2177	0	3
4	1	FLATWATER	11	58	233	2	4.5	0.3	209	835	63	250	0	0
7	7	POOL	18	17	121	1	9.2	3.3	155	1085	475	3322	459	10
10	0	DRY	26	1193	11928	81	0.0	0.0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
38	11	14657	7471	5750

Duncan Creek — Drainage: RUSSIAN RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 07/07/01

Confluence Location: QUAD: YORKVILLE LEGAL DESCRIPTION: T13NR12WS23 LATITUDE:38°58'17" LONGITUDE:123°8'23"

HABITAT UNITS #	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA EST. sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME EST. cu.ft.	MEAN RESIDUAL POOL VOL cu.ft.	MEAN SHELTER RATING	MEAN CANOPY %
17	3	LGR	45	140	2375	16	4	0.4	1.3	327	5551	128	2177	0	3	74
4	1	RUN	11	58	233	2	5	0.3	0.6	209	835	63	250	0	0	85
7	7	MCP	18	17	121	1	9	3.3	3.0	155	1085	475	3322	459	10	69
10	0	DRY	26	1193	11928	81	0	0.0	0.0	0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
38	11	14657	7471	5750

Duncan Creek — Drainage: RUSSIAN RIVER

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 07/07/01

Confluence Location: QUAD: YORKVILLE LEGAL DESCRIPTION: T13NR12WS23 LATITUDE:38°58'17" LONGITUDE:123°8'23"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
7	7	MAIN	100	17	121	100	9.2	3.3	155	1085	475	3322	459	10

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
7	7	121	1085	3322

Duncan Creek — Drainage: RUSSIAN RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES — Survey Dates: 07/07/01

Confluence Location: QUAD: YORKVILLE LEGAL DESCRIPTION: T13NR12WS23 LATITUDE:38°58'17" LONGITUDE:123°8'23"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH	>=4 FEET PERCENT OCCURRENCE
7	MCP	100	0	0	2	29	4	57	1	14	0	0

TOTAL UNITS
7

Duncan Creek — Drainage: RUSSIAN RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE — Survey Dates: 07/07/01

Confluence Location: QUAD: YORKVILLE LEGAL DESCRIPTION: T13NR12WS23 LATITUDE:38°58'17" LONGITUDE:123°8'23"

UNITS MEASURED	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
17	2	LGR	0	0	0	0	0	0	0	100	0
4	0	RUN	0	0	0	0	0	0	0	0	0
7	5	MCP	10	0	0	0	0	0	0	60	30
10	0	DRY	0	0	0	0	0	0	0	0	0

TABLE 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Duncan Creek
SAMPLE DATES:
STREAM LENGTH: 14657 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: YORKVILLE — Latitude: 38°58'17"
Legal Description: T13NR12WS23 — Longitude: 123°8'23"

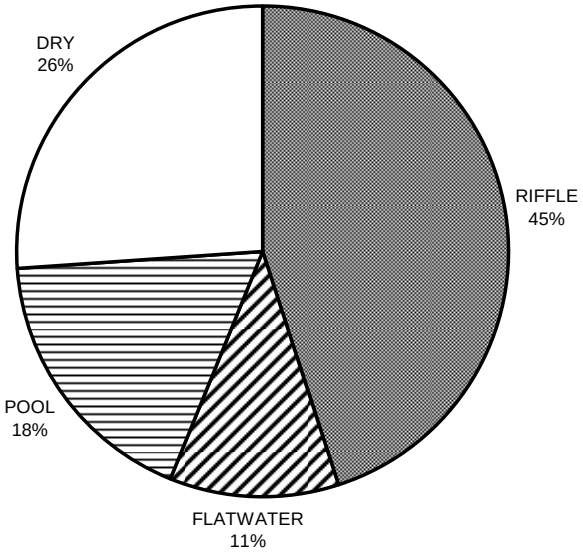
SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: B3 — Canopy Density: 74%
Channel Length: 14657 ft. — Coniferous Component: 76%
Riffle/flatwater Mean Width: 4 ft. — Deciduous Component: 24%
Total Pool Mean Depth: 3.3 ft. — Pools by Stream Length: 1%
Base Flow: 0.0 cfs — Pools >=3 ft.deep: 14%
Water: 62 - 70 °F Air: 64 -77 °F — Mean Pool Shelter Rtn: 10
Dom. Bank Veg.: Coniferous Trees — Dom. Shelter: Boulders
Vegetative Cover: 57% — Occurrence of LOD: 0%
Dom. Bank Substrate: Boulder — Dry Channel: 11928 ft.

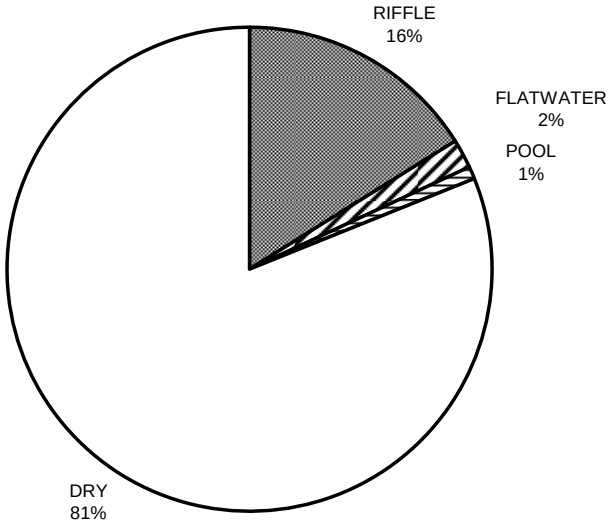
Embeddness Value: 1. 100% 2.0% 3. 0% 4. 0% 5. 0%

DUNCAN CREEK
LEVEL II HABITAT TYPES BY PERCENT OCCURRENCE



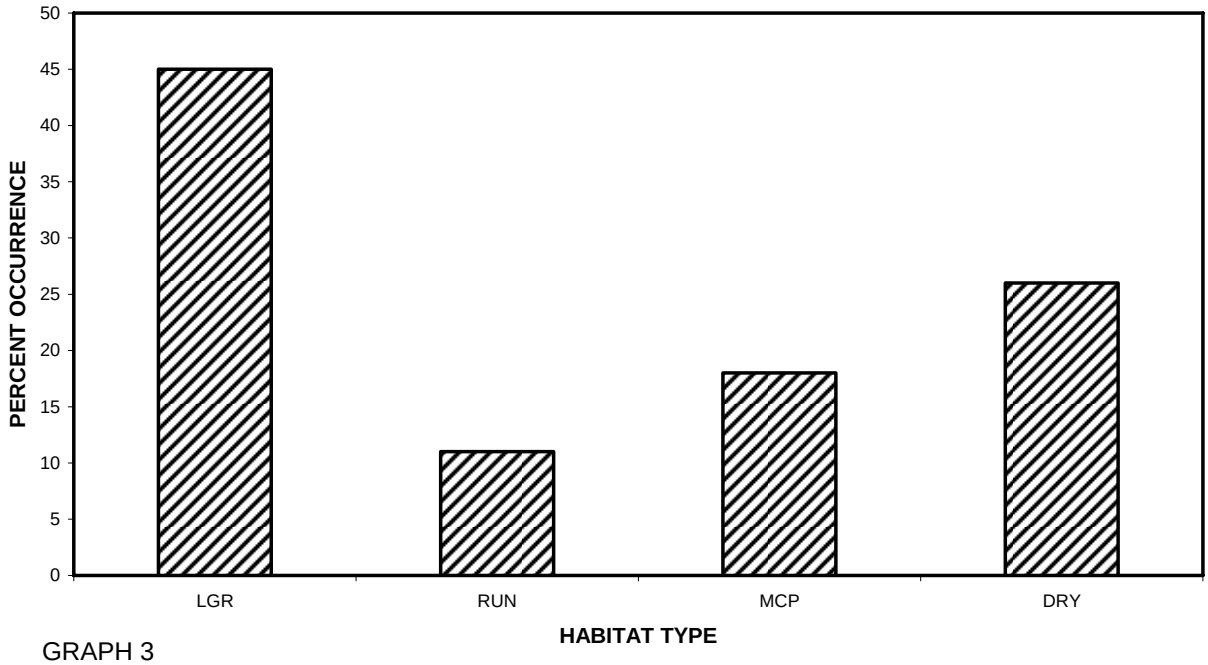
GRAPH 1

DUNCAN CREEK
LEVEL II HABITAT TYPES BY PERCENT TOTAL LENGTH



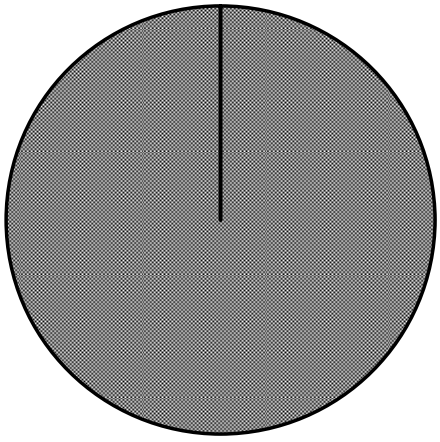
GRAPH 2

DUNCAN CREEK
LEVEL IV HABITAT TYPES BY PERCENT OCCURRENCE



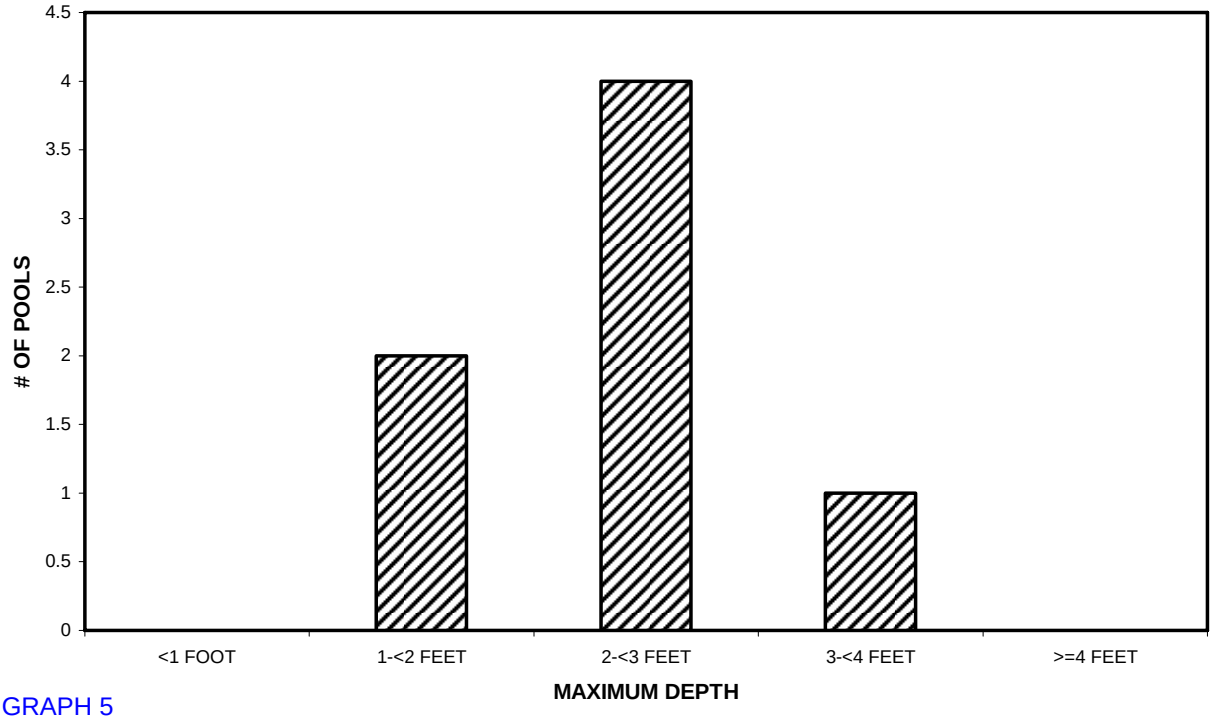
GRAPH 3

DUNCAN CREEK
LEVEL I POOL HABITAT TYPES BY PERCENT OCCURRENCE



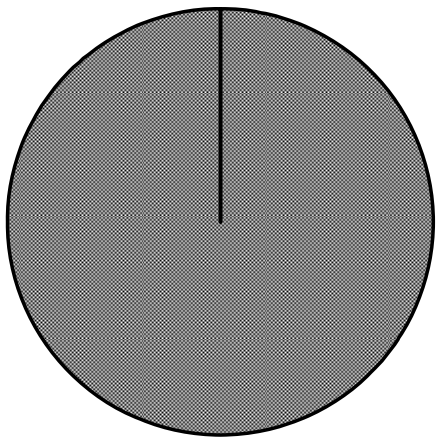
GRAPH 4

DUNCAN CREEK
MAXIMUM DEPTH IN POOLS



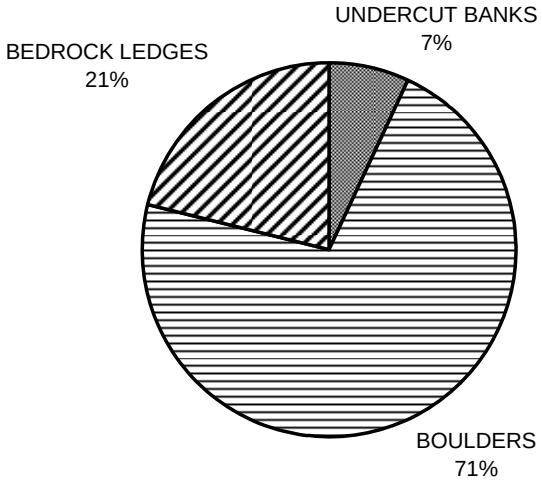
GRAPH 5

DUNCAN CREEK
PERCENT EMBEDDEDNESS



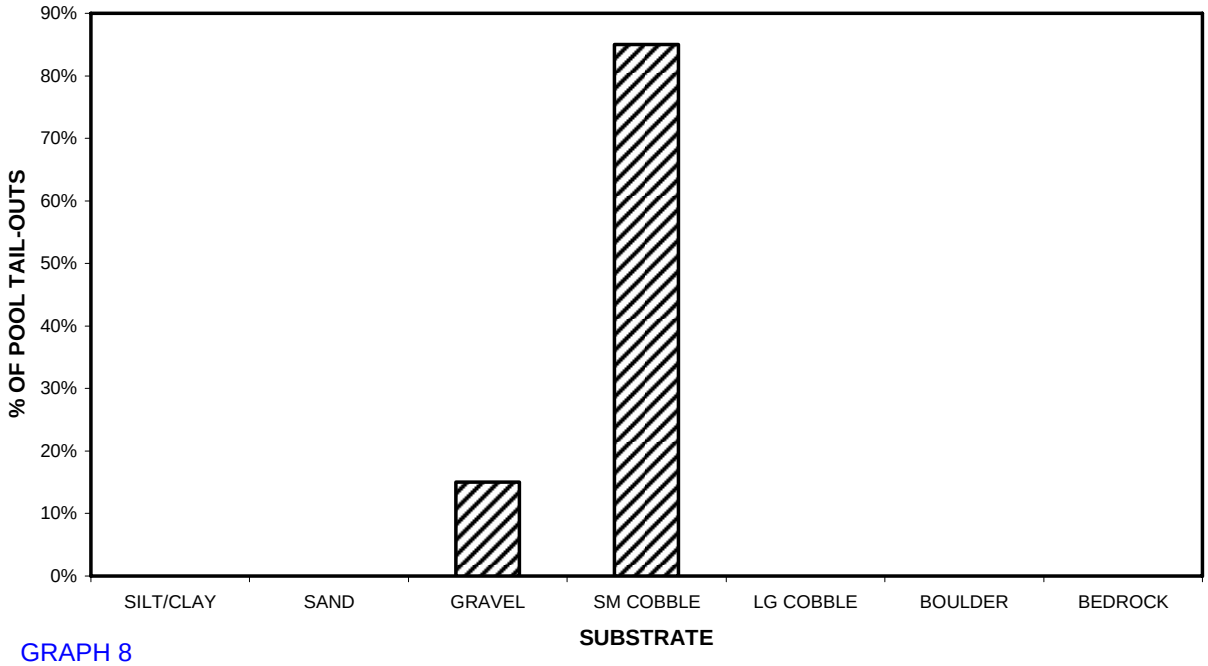
GRAPH 6

DUNCAN CREEK
MEAN PERCENT COVER TYPES IN POOLS



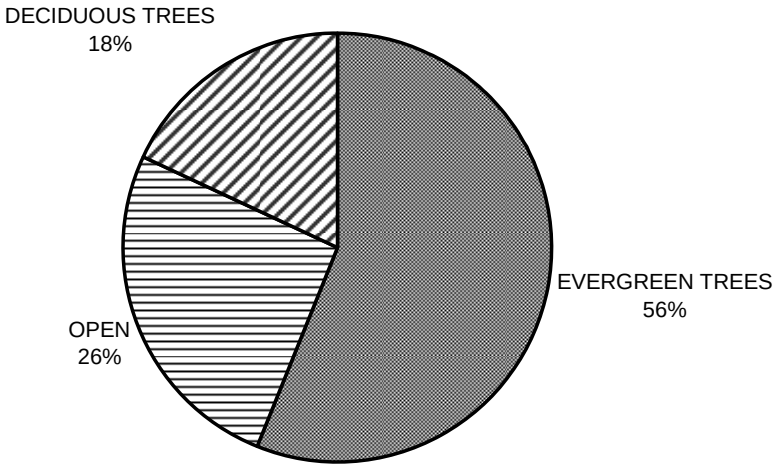
GRAPH 7

DUNCAN CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



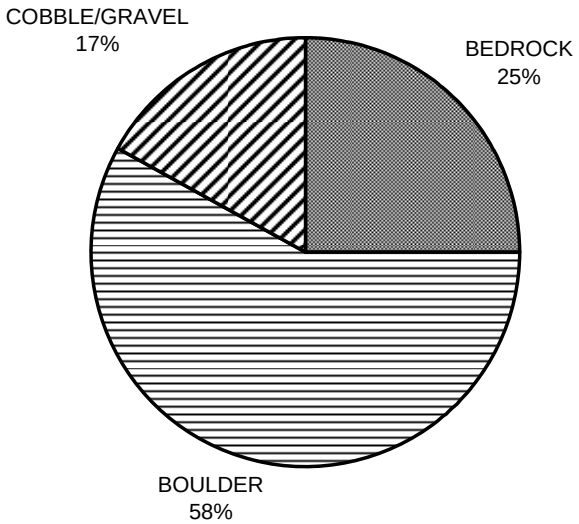
GRAPH 8

DUNCAN CREEK
MEAN PERCENT CANOPY



GRAPH 9

DUNCAN CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

DUNCAN CREEK

DOMINANT BANK VEGETATION IN SURVEY REACH

GRAPH 11

Watershed Hydroid **416** Duncan Creek

Hydrologic Sub-Areas covered by the watershed:

Name:	LLId: (1:24k)	County:
Duncan Creek	1231398389714	Mendocino

Tributary to Feliz Creek
Tributary to Russian River
Tributary to

Location: **T:** 13N **R:** 12W **S:** 23 **Latitude:** 38.9714872176368 **Longitude** 123.139854533312

Hydrologic Boundary Delineation: Watershed boundaries were delineated using the Watershed Point tool in ArcHydro, running under ArcMap 8.3 (ArcInfo version). A 1:24k stream network was "burned" into the underlying DEM to enforce hydrologic routing.

Aerial Photos (Source): For Mendocino County watersheds, 1993 USGS DOQQs are available in the Teale Albers, NAD27 projection. For Sonoma County watersheds, 2000 County-created orthophotos in the State Plane, NAD83 projection are also available.

Stream Order: 4

Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nchydro1" 1:24k streams layer.

Total Length: 3.18 Miles / 5.13 Km

Note: Length is for the USGS blue-line 1:24,000 stream.

Drainage Area: 2246 Hectares / 5550 Acres / 8.67 sq. mi.

Elevations: Mouth: 512 feet; Headwaters: 3166 feet

Note: Headwaters elevation is the highest elevation found in the watershed.

Lakes in Watershed: Number: 0 Surface area: 0 sq. mi.

Note: Source for lakes data is the USGS-DFG 1:100k lakes layer "lakes.shp"

Fish Species (as indicated by historical salmonid streams layer created by Bob Coey): Steelhead

Ownership, for the watershed, in acres (and % of total watershed):

Federal:	State:	Local:	Private:
0.0 acres	0.0	0.0	5549.6
0.00 %	0.00 %	0.00 %	100.00 %

Note: Source for owneship data is 2002 DFG-CCR "ccr_public_lands.shp" GIS layer.

Major Land Uses in the Watershed, in acres (and % of total watershed)

Mixed hardwood/conifer:	Hardwood:	Conifer:	Agriculture:	Urban:
540.69 acres	3281.70	628.10	47.10	0.00
9.7 %	59.1 %	11.3 %	0.8 %	0.0 %

Shrub:	Herbaceous:	Barren/rock:	Water:
394.28	652.04	0.15	4.94
7.1 %	11.7 %	0.1 %	0.1 %

Note: Land use areas were calculated using the 1994 CDF-USFS "Calveg" GIS layer.

Watershed HydroId **416** Duncan Creek

USGS 7.5' Topographic Quads completely or partially in the watershed:

Quad Name	USGS Code
YORKVILLE	38123H2

Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, May 5, 2003 version)

Scientific Name	Common Name
Ceanothus confusus	Rincon Ridge ceanothus
Arctostaphylos stanfordiana ssp. raichei	Raiche's manzanita

Hydrologic Sub-Areas covered by the watershed

Hydrologic Sub-Area Name:	ID code (RBUAS)	Hydrologic Area Name	% of watershed in this HSA
Ukiah	111431	Upper Russian River	100