

**CALIFORNIA DEPARTMENT OF FISH AND GAME  
STREAM INVENTORY REPORT**

Matanzas Creek

*Report revised April 14, 2006*

*Report Completed 2000*

*Assessment Completed 1997*

INTRODUCTION

A habitat inventory was conducted during the summer of 1997 on Matanzas Creek starting at the E Street Bridge crossing in Santa Rosa. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Matanzas Creek. No biological inventory has been done to date, as a barrier exists just up from the mouth of Matanzas Creek.

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

Matanzas Creek is a tributary to Santa Rosa Creek which flows into the Laguna de Santa Rosa, which flows into Mark West Creek, a tributary of the Russian River, located in Sonoma County, California (see Matanzas Creek map, page 2). The legal description at the confluence with Santa Rosa Creek is T7N, R8W, S24. Its location is 38°26'15" N. latitude and 122°42'40" W. longitude. Year round vehicle access exists from Highway 101 near Santa Rosa, via Santa Rosa Avenue.

Matanzas Creek and its tributaries drain a basin of approximately 8.2 square miles. Matanzas Creek is a second order stream and has approximately 9.2 miles of blue line stream, according to the USGS Santa Rosa 7.5 minute quadrangle. Summer flow was measured as approximately .07 cfs. Elevations range from about 160 feet at the mouth of the creek to 700 feet in the headwaters. The watershed is privately owned. The northwestern pond turtle (*Clemmys marmorata marmorata*) and the Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*) were listed in the DFG's Natural Diversity Database with a federal status of species of concern for the Matanzas Creek watershed.

METHODS

The habitat inventory conducted in Matanzas Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The AmeriCorps Volunteers 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 and was supervised by Bob Coey, Russian River Basin Planner (DFG).

## 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 Matanzas Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

### 1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

### 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.

### 3. Temperatures:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures are also recorded using remote Temperature recorders which log temperature every two hours, 24 hours/day.

### 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". Matanzas 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 unit lengths were measured, additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were completely sampled (length, mean width, mean depth, maximum depth and pool tail crest depth). All measurements were in feet to the nearest tenth.

## 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Matanzas 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), 76 - 100% (value 4) or "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Matanzas Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were visually estimated using a list of seven size classes.

## 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual, 1998. Canopy density relates to the amount of stream shaded from the sun. In Matanzas 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:

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 Matanzas Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured unit were selected from the

habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

### BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. The biological inventory was conducted using stream bank observation.

### DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE IV data entry program developed CDFG. This program processes and summarizes the data, and produces the following tables and appendices:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Shelter by habitat types
- Dominant substrates by habitat types
- Vegetative cover and dominant bank composition
- Fish habitat elements by stream reach

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Matanzas Creek include:

- Level II Habitat Types by % Occurrence and % Total Length
- Level IV Habitat Types by % Occurrence
- Pool Habitat Types by % Occurrence
- Maximum Depth in Pools
- Pool Shelter Types by % Area
- Substrate Composition in Low Gradient Riffles
- Percent Cobble Embeddedness by Reach
- Mean Percent Canopy
- Mean Percent Canopy by Reach
- Percent Bank Composition and Bank Vegetation

### HISTORICAL STREAM SURVEYS:

No historical stream surveys exist for Matanzas Creek.

## HABITAT INVENTORY RESULTS

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

The habitat inventory of June 10 - 26, 1997 was conducted by Joyce Ambrosius and Leigh Miles (Sonoma County Water Agency) with supervision and analysis by CDFG. The survey began at the E Street bridge crossing upstream of the culvert and extended up Matanzas Creek until the creek became dry. The total length of the stream surveyed was 22634 feet, with an additional 461 feet of side channel.

Flow was estimated to be 0.07 cfs during the survey period.

The inventoried section of Matanzas Creek has one channel type, from the mouth to 22634 feet an F3. F3 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly cobble substrate.

Water temperatures ranged from 62°F to 78°F. Air temperatures ranged from 62°F to 91°F. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder placed at habitat unit #128 logged temperatures every 2 hours from May 20 - September 9, 1997. The highest temperature recorded was 67°F in July and the lowest was 58°F in May. Another recorder placed near the golf course (approximately habitat unit #225) logged temperatures from May 20 - September 9, 1997. The highest temperature recorded was 70°F in August and the lowest was 58°F in May.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 46% flatwater units, 33% pool units, 15% riffle units, and 6% dry streambed units. Based on total **length** there were 44% flatwater units, 40% pool units, 8% dry streambed units, and 4% riffle units (Graph 1).

Two hundred eighty-two habitat units were measured and 16% were completely sampled. Twelve level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were glides at 30%, runs 16%, low gradient riffles 15% and root wad scour pools 14% (Graph 2). By percent total **length**, glides made up 35%, root wad scour pools 14%, mid-channel pools 11%, and runs 9%.

Ninety-three pools were identified (Table 3). Scour pools were most often encountered at 76%, and comprised 61% of the total length of pools (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seventy nine of the 93 pools (85%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 37% of the total length of stream habitat.

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. Pool types had the highest shelter rating at 48.

Riffles had the lowest rating with 0 and flatwater rated 12 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 58, scour pools rated 48, and main channel pools rated 45 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were boulders at 26%, root masses 24%, undercut banks 14%, and terr. vegetation 14%. Graph 5 depicts the pool shelter in Matanzas Creek.

Table 6 summarizes the dominant substrate by habitat type. Large cobble was the dominant substrate observed in 3 of the 5 low gradient riffles measured. Small cobble was dominant in 2 of the low gradient riffles (Graph 6).

No mechanical gravel sampling was conducted in 1998 surveys.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 93 pool tail-outs measured, four had a value of 3 (4%), and 89 had a value of 4 (96%).

The mean percent canopy density for the stream reach surveyed was 64%. The mean percentages of deciduous and evergreen trees were 70% and 30%, respectively. Graph 8 describes the canopy for the entire survey and graph 9 describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 90% and the mean percent left bank vegetated was 83%. For the habitat units measured, the dominant vegetation types for the stream banks were: 46% deciduous trees, 24% brush, 23% evergreen trees, and 6% grass. The dominant substrate for the stream banks were: 68% silt/clay/sand, 16% cobble/gravel, 13% boulder and 3% bedrock (Graph 10).

Summer water temperatures were measured for a second season in the summer of 1998 using remote temperature recorders (see Temperature Summary graphs at end of report). A recorder placed near the Hemenway property (habitat unit #128) logged temperatures every 2 hours from June 22 - September 30, 1998. The highest temperature recorded was 70°F (20.9°C) in July and the lowest was 58°F (14.4°C) in both July and August. Another recorder was placed near the golf course (approximately habitat unit #225) logged temperatures from June 22 - September 30, 1998. The highest temperature recorded was 67°F (19.4°C) in July and the lowest was 58°F (14.4°C) in September.

## BIOLOGICAL INVENTORY

### JUVENILE SURVEYS:

No juvenile surveys were conducted in 1997/1998, as a permanent barrier exists at the E Street crossing. However, a summary of recent data collected during the habitat typing survey appears in the table below.

Table 1. Species Observed in Recent Surveys			
YEARS	SPECIES	SOURCE	Native/Introduced
1997	Sacramento Sucker	SCWA	N
1997	Crayfish	SCWA	I
1997	Smallmouth Bass	SCWA	I

Historical records reflect that fish rescue/transfer operations occurred into Matanzas Creek in 1950.

Table 2. Summary of fish hatchery plants/transfers into Matanzas Creek				
YEAR	SOURCE	SPECIES	#	SIZE
1950	Austin Creek	SH	N/A	YEARLINGS

SH = steelhead

#### ADULT SURVEYS:

No spawning/carcass survey was conducted in 1997/1998.

#### DISCUSSION

Matanzas Creek has one channel type, a F3 (22634 ft.).

The 22,634 feet surveyed was an F3 channel type.

According to the DFG Salmonid Stream Habitat Restoration Manual, F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover.

Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

The water temperatures recorded on the survey days June 10 - 26, 1997 ranged from 62°F to 78°F. Air temperatures ranged from 62°F to 91°F. These temperatures, if sustained, are above the threshold stress level (65°F) for salmonids.

Pools comprised 40% of the total **length** of this survey. 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. In Matanzas Creek, the pools are relatively deep with 85% having a maximum depth of at least 2 feet. These pools comprised 37% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 48. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by boulders (26%), root masses (24%), undercut banks (14%), and terrestrial vegetation (14%). Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

One-hundred percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. The majority (96%) of the pool tail-outs sampled in the survey had cobble embeddedness values of 75% or more, a rating of 4. None had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Matanzas Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 64%. This is a low percentage of canopy, since 80 percent is generally considered most suitable for salmonids. Cooler water temperatures are desirable in Matanzas Creek. Elevated water temperatures could be reduced by increasing stream canopy. The large trees required for adequate stream canopy would also eventually provide a long term source of large woody debris needed for instream shelter and bank stability.

The riparian buffer is thin or nearly absent in areas with urban development. Riparian removal within the riparian corridor could all lead to less stream canopy and channel incision causing bank erosion and higher water temperatures.

## SUMMARY

The best spawning habitat in the watershed exists within the lower portion of Matanzas Creek. In Matanzas Creek, spawning and rearing habitat quality diminishes due to the effects of eroding stream banks, lack of riparian habitat, and increased temperatures. Additionally, these upstream effects seriously impact resources downstream especially during the warmer months when stream temperature rises, algae blooms and demand for oxygen and other resources increases. Sediment transported downstream in the winter also impacts potentially good quality spawning gravel

downstream.

Portions of Matanzas Creek have been channelized and levied, thus stream velocity has increased resulting in streambank erosion and loss of mature riparian. Little riffle habitat exists for spawning, and what does exist is unsuitable for spawning due to high gravel embeddedness. The unstable banks and effects of channelization in these reaches limits instream habitat improvement alternatives, although some opportunity exists. Any work considered will require careful design, placement, and construction that must include protection for the unstable banks and high stream velocities.

### GENERAL MANAGEMENT RECOMMENDATIONS

Matanzas Creek should be managed as an anadromous, natural production stream after the barrier is modified to provide fish passage.

Woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Efforts to increase flood protection or irrigation have led to long term problems in the system. 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.

### PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

- 1) Fish passage should be monitored, and improved where possible. Baffles should be installed in several culverts to facilitate easier fish access. A fish ladder is needed at the E Street crossing. All road culverts should be evaluated as migration barriers and modified or replaced if necessary. Rearing conditions upstream appear adequate at this time.
- 2) Increase the canopy on Matanzas Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects. Matanzas Creek would benefit from the 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.
- 3) In Matanzas Creek, active and potential road related sediment sources need to be mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 4) Matanzas 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.

- 5) Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against urban runoff.
- 6) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 7) Conduct biological sampling in Matanzas Creek.

PROBLEM SITES AND LANDMARKS - MATANZAS SURVEY COMMENTS

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

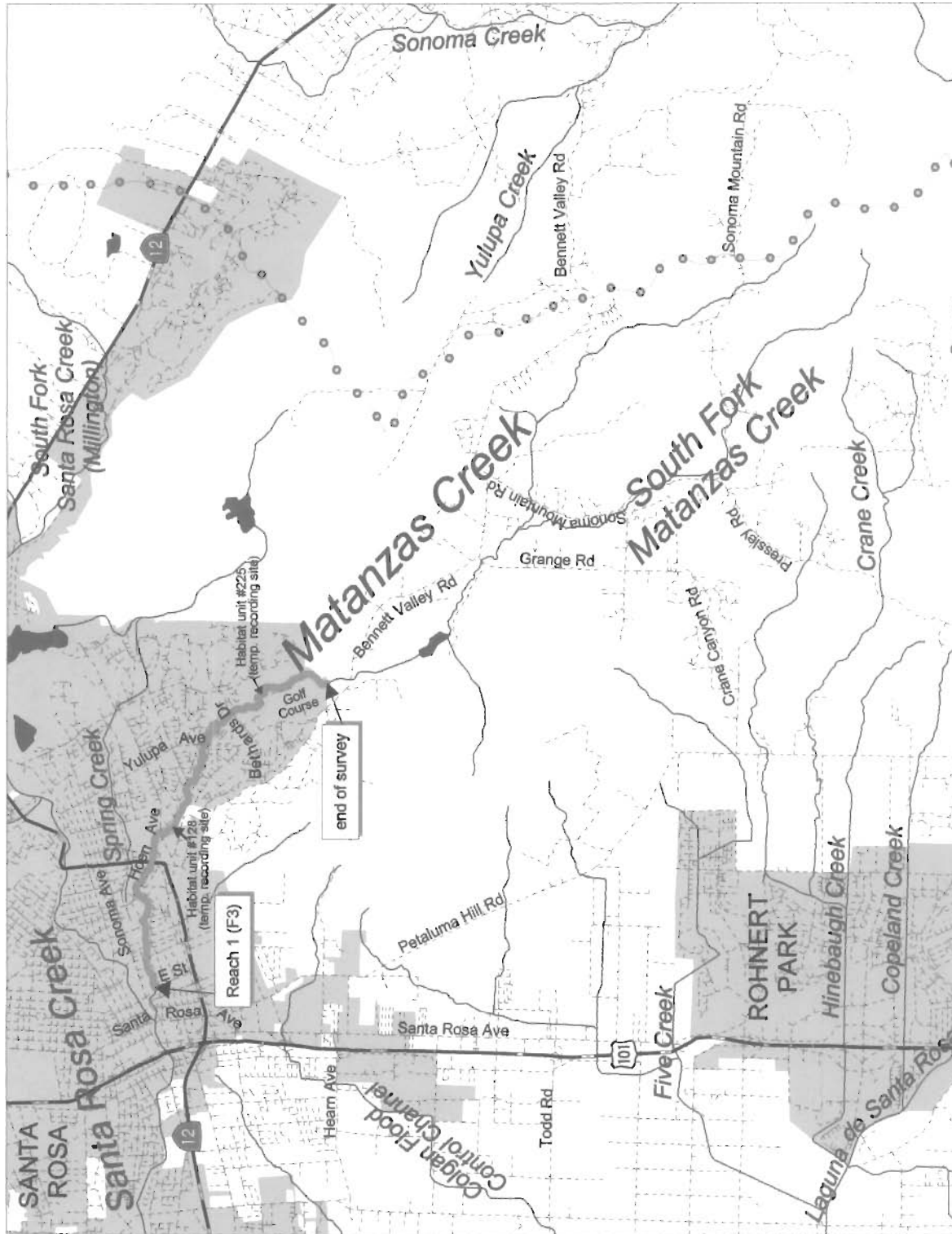
<u>Habitat Unit #</u>	<u>Stream Length (ft.)</u>	<u>Comments</u>
1.00	80	Start at So. E St. Bridge
6.00	499	Culvert leaking milky substance Rt bank.
12.00	880	Large culvert drainage on Lt bank.
34.00	2734	Large pool with culvert on left.
22.00	1621	Brookwood St. Bridge
31.00	2474	Beginning of Doyle Park
34.00	2734	Large pool with culvert on left.
40.00	3045	Culvert on Lt Bank
41.00	3134	Good spawning gravels in this area - a lot of silt
42.00	3258	Root wad and bedrock formed pool.
49.00	4246	Culvert on Lt Bank, oil scum on water.
50.00	4284	Brookhill Elementary
51.00	4382	Footbridge to park. Culvert, Lt Bank
52.00	4435	Crayfish
55.00	4728	End of park.
61.00	5204	Pool formed from cribwall
62.00	5234	Creek full of cement rip-rap.
63.00	5365	Suckers present. Cement rip-rap.
71.00	5911	Hoehn Ct. Culvert Lt Bank

74.00	6260	Algae in pool
79.00	6599	Creek filled with large cement bridge parts.
80.00	6668	Lt Bank composition is rip-rap
84.00	6880	Farmer's Lane Bridge
91.00	7438	Private bridge-Monteray Drive. Concrete bottom.
95.00	7665	Cement rip-rap on Rt Bank
101.00	8330	SHD present
108.00	8635	Hoen Frontage Rd. Bridge
109.00	8686	Large blow-out, Lt Bank
111.00	8819	Boulders/rip-rap, Lt Bank
113.00	8859	Erosion blow-out on Lt Bank
115.00	8971	Old road crossing
116.00	9023	Increase in gravel bars
128.00	9638	Hemenway's
129.00	9766	Small mouth bass in Hemenway pool(?)
133.00	9930	Concrete rip-rap on Rt Bank
139.00	10338	Start first occurrence for channel change on 6/17
141.00	10528	Trib Lt Bank. Roofing garbage
143.00	10594	Rip-rap for boulders (?)
146.00	10699	Drainage Rt Bank
150.00	11031	large culvert Lt Bank
151.00	11108	Frog present
156.00	11429	Cypress and Creekside Road
157.00	11467	Human-made small dam, rip-rap
161.00	11932	Francis residence
163.00	12092	Algae. Large sunfish, frog, and sculpin
165.00	12301	Dam sill 2' tall 5' wide across creek
167.00	12577	Glide continues estimated total length of glide (?)
168.00	12993	Start at Nichols creekside
168.00	13409	No Access
173.00	13818	Concrete rip-rap
178.00	14097	Lt Bank erosion. Culvert Lt Bank
182.00	14650	Pool at D/S side of bridge sill
183.00	14976	Yulupa bridge
185.00	15203	Concrete rip-rap
187.00	15297	Santa Rosa City Park area
189.00	15622	Algae in pool. Blueish colored water
193.00	15866	Greywacke. bedrock bottom
197.00	16081	Coffee bean colored water
198.00	16195	Bunchgrass
199.00	16395	Dam or bridge abutments? sill across creek, about 3'H
202.00	16983	Bethards bridge camp.
203.00	17032	Upstream of Bethards bridge culvert.
205.00	17185	Riffle areas are barely wet.

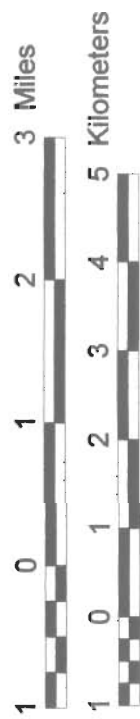
206.00	17287	Water is very shallow. Channel not defined, grass and meadow.
223.00	18409	Pool downstream of culvert and road crossing. Bass and sunfish present
224.00	18429	Culvert under road (dry), 2' drop to pool
225.00	19054	Large pool upstream closed culvert
227.00	19169	Narrow grass area, log jam 4'H X 9'W X 3'L
241.00	19756	Log across creek creating pool.
244.00	20084	Large gravel bar.
245.00	20112	Creek is running, yesterday it was not. Flow regulated by golf course
246.00	20135	Water being released, very warm
247.00	20149	Bedrock outcrop, Lt Bank
254.00	20374	Culvert under road.
255.00	20408	Upstream of culvert start
260.00	20589	Channel full of tall cattails
262.00	20843	Water inlet at 150' into unit
264.00	21006	Streambed is dry
266.00	21190	Isolated pools
267.00	21355	Downstream of culvert outlet, culvert dry
273.00	22650	End of golf course and access

\*\*END OF SURVEY\*\*

# Matanzas Creek



Central Coast Region  
 Department of Fish and Game



Scale = 1:85,000

Matanzas Creek Tables Graphs Map  
 Assessment Completed 1997  
 Page 1 of 9

- Streams
- Creeks
- Russian River
- Main boundary
- Wetlands
- 2000 limits

Matanzas Creek Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 06/10/97 to 06/26/97

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08WS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

HABITAT UNITS	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	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
42	5 RIFFLE	15	22	912	4	0.2	225	9465	55	2306	0	0
129	18 FLATWATER	46	79	10217	44	0.8	1278	164849	1387	178961	0	12
93	22 POOL	33	100	9273	40	2.0	2597	241559	6632	616804	3499	48
16	1 DRY	6	116	1861	8	0.0	0	0	0	0	0	0
2	0 NOT SURVE	1	416	831	4	1.0	0	0	0	0	0	90
TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq. ft.)		TOTAL VOL- (cu. ft.)		
282	46			23095				415874		798071		

Matanzas Creek Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS Survey Dates: 06/10/97 to 06/26/97

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08MS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL	MEAN SHELTER	MEAN CANOPY
#			%	ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.	%	%
42	5	LGR	15	22	912	4	1.1	225	9465	55	2306	0	0	68
85	13	GLD	30	95	8056	35	1.0	1668	141780	1985	168761	0	17	60
44	5	RUN	16	49	2161	9	0.4	524	23069	232	10199	0	4	58
19	3	MCP	7	137	2600	11	2.3	3232	61405	7931	150687	5578	45	67
3	1	CRP	1	77	231	1	2.3	1436	4309	3755	11266	2054	20	30
3	0	LSL	1	48	144	1	1.3	860	2579	1283	3850	1023	40	50
39	8	LSR	14	84	3265	14	2.0	1786	69640	4062	158413	3241	58	68
12	5	LSBK	4	87	1048	5	1.9	1775	21304	3921	47049	2730	29	74
8	2	LSBO	3	86	688	3	2.4	1685	13477	4707	37656	3820	40	66
6	2	PLP	2	53	318	1	1.7	1093	6559	2252	13511	2219	38	43
3	1	DPL	1	326	979	4	1.8	20762	62287	64791	194374	1528	58	73
16	1	DRY	6	116	1861	8	0.0	0	0	0	0	0	0	71
2	0	NS	1	416	831	4	1.0	0	0	0	0	0	90	0
TOTAL UNITS	282			LENGTH (ft.)	23095			AREA (sq.ft)	415874		TOTAL VOL. (cu.ft)	798071		

Metanzas Creek Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Survey Dates: 06/10/97 to 06/26/97

Table 3 - SUMMARY OF POOL TYPES

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08MS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

HABITAT UNITS	HABITAT FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	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
19	3	MAIN	20	137	2600	28	2.3	3232	61405	7931	150687	5578	45
71	18	SCOUR	76	80	5693	61	2.0	1660	117868	3827	271743	2994	48
3	1	BACKWATER	3	326	979	11	1.8	20762	62287	64791	194374	1528	58
TOTAL UNITS	22			TOTAL LENGTH (ft.)	9273			TOTAL AREA (sq.ft.)	241559		TOTAL VOL. (cu.ft.)	616804	

Matanzas Creek Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 06/10/97 to 06/26/97

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08WS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FOOT MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FOOT MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FOOT MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FOOT MAXIMUM DEPTH	>=4 FOOT PERCENT OCCURRENCE
19	MCP	20	0	0	3	16	1	5	3	16	12	63
3	CRP	3	0	0	0	0	1	33	1	33	1	33
3	LSL	3	0	0	1	33	1	33	1	33	0	0
39	LSR	42	0	0	6	15	10	26	12	31	11	28
12	LSBk	13	0	0	2	17	4	33	1	8	5	42
8	LSBo	9	0	0	0	0	3	38	2	25	3	38
6	PLP	6	0	0	2	33	2	33	0	0	2	33
3	DPL	3	0	0	0	0	1	33	0	0	2	67

TOTAL  
UNITS  
93

Matanzas Creek Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Table 5 - Summary of Shelter by Habitat Type Survey Dates: 06/10/97 to 06/26/97

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08MS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

UNITS MEASURED	HABITAT TYPE	BANKS		SMD	LWD	ROOT MASS VEGETATION	TERR. VEGETATION	AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
		% TOTAL UNDERCUT	% TOTAL BANKS								
42	32 LGR	0	0	0	0	0	0	0	100	0	0
85	51 GLD	16	10	7	16	19	0	0	0	29	2
44	20 RUN	2	0	0	30	0	0	0	0	68	0
19	17 MCP	13	10	5	28	13	3	0	0	25	2
3	3 CRP	4.7	7	0	15	19	0	0	0	7	5
3	2 LSL	30	40	0	8	22	0	0	0	0	0
39	33 LSR	18	12	8	37	11	0	0	0	8	4
12	9 LSBK	18	4	0	21	3	0	0	0	22	32
8	5 LSB0	16	0	0	20	10	0	0	0	51	3
6	3 PLP	14	10	0	35	10	4	0	0	25	0
3	3 DPL	4	20	2	6	20	0	0	0	48	0
16	2 DRY	0	0	0	0	0	0	0	0	0	0
2	1 NS	0	0	0	0	0	0	0	0	0	0
282	190	14	12	5	23	14	1	0	0	27	4
93	75	14	13	5	24	14	1	0	0	26	4

Matanzas Creek

Drainage: Santa Rosa Cr, Laguna de Santa Rosa, Mark West Cr, Russian

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 06/10/97 to 06/26/97

Confluence Location: QUAD: Santa Rosa LEGAL DESCRIPTION: T07NR08WS24 LATITUDE: 38°26'15" LONGITUDE: 122°42'40"

TOTAL HABITAT UNITS MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
5	LGR	0	0	0	40	60	0	0
14	GLD	21	7	14	29	14	7	7
5	RUN	0	0	20	40	40	0	0
3	MCP	0	67	0	0	0	33	0
1	CRP	0	0	100	0	0	0	0
1	LSL	0	100	0	0	0	0	0
8	LSR	13	50	0	25	0	0	13
4	LSBk	0	25	0	0	50	0	25
2	LSBc	0	100	0	0	0	0	0
2	PLP	0	50	0	0	0	50	0
2	DPL	50	0	0	0	50	0	0
1	DRY	0	0	0	0	100	0	0
0	NS	0	0	0	0	0	0	0

Matanzas Creek

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
64.34	29.83	70.17	90.43	83.30

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	2	1	3.19
Boulder	7	5	12.77
Cobble/Gravel	6	9	15.96
Silt/clay	32	32	68.09

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	4	2	6.38
Brush	16	7	24.47
Deciduous Trees	15	28	45.74
Evergreen Trees	12	10	23.40
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Matanzas Creek  
SAMPLE DATES: 06/10/97 to 06/26/97  
SURVEY LENGTH:

MAIN CHANNEL: 22634 ft.  
LOCATION OF STREAM MOUTH:  
USGS Quad Map: Santa Rosa  
Legal Description: T07NR08WS24

SIDE CHANNEL: 461 ft.  
Latitude: 38°26'15"  
Longitude: 122°42'40"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-273)

Channel Type: F3	Mean Canopy Density: 64%
Main Channel Length: 22634 ft.	Evergreen Component: 30%
Side Channel Length: 461 ft.	Deciduous Component: 70%
Riffle/Flatwater Mean Width: 12.5 ft.	Pools by Stream Length: 41%
Pool Mean Depth: 2.0 ft.	Pools >=2 ft. Deep: 85%
Base Flow: 0.1 cfs	Pools >=3 ft. Deep: 60%
Water: 62-78°F Air: 62-91°F	Mean Pool Shelter Rtn: 48
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 87%	Occurrence of LOD: 22%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 1773 ft.
Embeddness Value: 1. 0% 2. 0% 3. 4% 4. 96% 5. 0%	