APPENDICES

APPENDIX A

Personnel communications cited in text:

Agajanian, Jeff. USGS-San Diego. 3/5/97. Provided updated flow records for USGS gauge stations 11046000, 11044300, 11046700, 11402000.

Ball, Orville. Research fishery biologist, per. comm. 2/21/96. Interviewed Native Americans on Pauma Reservation about fish.

Boyer, Dave. 1/20/95. Biologist, USMCB Environmental Security, Camp Pendleton, CA. Provided the account of a trout found by game warden in San Mateo Creek.

Brain, Allen. 5/27/97. Many recollections growing up and fishing the Santa Margarita River and De Luz Creek. Sent photo of him and two fish caught in the 1940's.

Brown, Jim. 2/20/96. Fishermen. Recalled catching 15" steelhead and hatchery trout near Fallbrook in 1967-68.

Buck, Slader, 8/3/96. Camp Pendleton Environmental Security biologist.

Chase, Shawn. 1997. Entrix, Inc. Monitored results of fish ladder and fish screen in the Santa Clara River.

Clemmens, Marion. 5/9/1997. Long time resident of Fallbrook, CA. worked on a Santa Margarita River ranch as a teenager and fished the San Mateo Creek in the 1930's (born 1918).

Downie, Scott. 1996. CDFG fishery biologist. Co-authored Habitat Typing Manual, Fortuna, CA.

Giusti, Mike. 8/5/96. CDFG. Conducted native fish surveys in 1995 on De Luz Creek and the San Margarita River. Electra-shocked San Mateo Creek with no steelhead observed. Also provided an account of a warden stocking brown trout in San Mateo Creek in 1988.

Greenwood, Allen. San Diego County trout advocate. Wrote proposal for the restoration of San Mateo Creek. History of trout plants in San Diego County. Provided interviews of several old time San Diego area fishermen.

Henke, Ed. 1/12/95. Keynote Speaker of southern California Steelhead Symposium, 3/28/96. Ventura, CA. Currently lives in Ashland, Oregon.

Holland, Dan. PhD. 2/12/96. Amphibian and southwestern pond turtle expert. Participant in surveys of Base lagoons in the spring of 1996, and the North Fork San Onofre Creek during spring of 1997.

Jenz, Jim. 2/13/97. Santa Margarita River Water-master, Confirmed flow data.

Jessup, David Sr. 2/21/96. Fished San Diego County in the 1940's. Recalled catching rainbows in the San Onofre Creek and Santa Margarita River. Provided notebook on the history of fish plants in San Diego county going back to 1900's.

Jong, Bill. 2/15/96. CDFG fishery biologist, Anadromous Branch, Arcata.

Kramer, Richard. 6/18/97. CDFG warden in the 1940's. Fished San Mateo Creek in the canyon area, Base gravel pits, and estuary.

Maytorena, Marty. 5/7/1997. CDFG game warden for Orange County. Recalled stocking brown trout from Fillmore Hatchery in the San Mateo Creek 1983-1985.

Netti, Steve. 1/18/95. San Diego Fly Fishers. Volunteer for CDFG stream surveys in southern California and provided an account of on adult steelhead from San Mateo Creek in 1991.

Nielsen, Jennifer. 2/15/96 & 8/5/96. Genetics expert. Conducted DNA studies of southern California steelhead. went through the UMMZ fish collection, CAS fish collection and the Smithsonian collection from early Railroad Survey for DNA samples. Stanford University, Hopkins Marine Institute.

Phifer, Dave. 1997. Letter from retired Lt. Col., worked on Camp Pendleton mapped the geology in the 1950's and fished the back country of San Mateo Creek. Caught small trout in the San Mateo Creek near fisherman Camp in the Cleveland National Forest.

Shipek, Florence. PhD. Anthropologist. 5/1/97. Worked extensively on the culture and history of the Pauma, Rincon and La Jolla Indian tribes. Interviewed members of tribes to learn cultural history. Conducted interviews with members of the Luiseno Indian tribe in the 1950's and 1960's who were young in the 1890's and 1900's and harvested large fish (presumably southern steelhead) from the San Luis Rey.

Stromberg, Steve. 9/17/96. Mr. Stromberg, contacted CDFG questioning why the southern extent of southern steelhead was Malibu Creek. CDFG fisheries biologist Alex Vehar, forwarded his name to John Lang CCFWO, and he was interview for this report. Past resident, surfer, fishermen of the southern coast. Observed many steelhead fry in the estuary of San Mateo Creek in August. His last observations were in the late 1980's. Saw a school of them from one foot away by RR. trestle and along the north side of lagoon, patches of algae in water. Got a round in lagoon in a canoe. He also mentioned catching a 15 inch steelhead below Fisherman Camp in the Cleveland National Forest, in 1977. Currently lives in Studio City, Los Angeles, CA.

Sutherland, George. 2/8/96. Trout Unlimited. Contact for ad in local paper requesting steelhead information. Interviewed Tom Tanaka, a farmer on San Mateo Creek who caught steelhead adults in the winter of 1986, near the leased farmland.

Sweet, Samuel S. PhD. 2/20/96. Depart. of Biology, University of California Santa Barbara. Arroyo toad expert.

Ulmer, Linda. 1997. Former CDFG employee. Compiled notes from stream surveys and interviewed fishery biologists for southern California.

Uplinger, Dick. per. comm. 2/21/96 & 8/5/96. CDFG hatchery manager. Requested records of trout plants on the San Margarita River and San Mateo Creek from Mojave River Hatchery, Victorville, CA.

U.S. Forest Service.' Trabuco Ranger District, Corona - No fish surveys.

Vejar, Alex. 1997. CDFG Inland Fishery Biologist, San Diego County. Operated a adult trap at the mouth of San Mateo Creek, Spring 1997. Participated in survey of San Onofre Creek during September 1996.

Woelfel, Dave. 1995, 1997. MS thesis on restoration of San Mateo creek (Woelfel 1991). Provided old photos and references and participated in surveying San Mateo Creek during spring 1997.

Zedler, Paul. 1/18/96. San Diego State University, Ecology Dept. Manages field station at Santa Margarita River Ecological Reserve.

Sources contacted but not cited in text:

Barnhart, Roger. pers. comm. 1/13/95. USFWS Cooperative Fish Unit. Humboldt State University, Arcata CA. Steelhead expert.

Benthin, Randy. pers. comm. 2/15/96. CDFG Region 1 supervisor. Located old journal of fish plants in California.

Bryant, Greg. pers. comm. 1/12/95 & 8/15/96. NMFS biologist, two unpublished reports on southern California steelhead. Account of a (18-19") steelhead from San Mateo Creek that a farmer had pitch-forked in 1990 or 1991. Received a conflicting report from Pat Higgins, and thus we did not include this account in the San Mateo Creek time-line table.

California Academy of Science Fish Collection, San Francisco. 8/10/96. Bruce Oppenhiem, personally conducted the searched of the Academy's specimen collection for *Salmo gairdneri* Richardson, *Salmo gairdneri gairdneri, S. g. nelsoni, S. g. irideus, Oncorhynchus mykiss*.

California Department of Fish and Game. 4/25/96. Region 5, Long Beach Library. Searched for old stream survey files, notes, and correspondence regarding Base streams.

California Department of Fish and Game. Natural Diversity Data Base search for *Salmo gairdneri* Richardson, *Salmo g. gairdneri, S. g. nelsoni, S. g. irideus, Oncorhynchus mykiss* in southern California. 8/12/96.

Cardone, Al. CDFG. per. comm. 2/20/96. Provided names and contacts for old stocking records.

Catania, David. California Academy of Science, pers. comm. 2/20/96. Fish collection curator, conducted computer search for southern California steelhead and *Salmo gairdneri* Richardson, *Salmo g. gairdneri, S. g. nelsoni, S. g. irideus, Oncorhynchus mykiss*. A few records from southern California. (Note: only one-third of the specimens actually in computer data base).

Chubb, Sara. per. comm. 2/10/97. Biologist, Los Padres National Forest. Mentioned Cindy Carpanzo's report and Kathleen Matthews paper on habitat usage by steelhead in pools, Pacific Southwest Range and Experimental Station, Berkeley.

Edmundsen, Jim. pers. comm. 1/20/95. California Trout.

Eigenmann, C.H. 1892. The fishes of San Diego, California. Proceedings of the National Museum. Vol. 15(897):123-143.

Foreman, Terry. pers. comm. 2/1/95. CDFG district biologist, Ramona, CA.

Gerstrung, Eric. pers. comm. 1/11/95. CDFG biologist in charge of summer steelhead.

Harper, Brooks. pers. comm. 8/5/96. USFWS, Honolulu, Hawaii. Surveyed southern California streams. Recalled electro-shocking Sespe Creek, Ventura County.

Hayne, Michael. CDFG. per. comm. 2/21/96. Hatchery stocking records.

Higgins, Pat. 1/20/97. Fishery Consultant, Arcata CA. Authored report to Trout Unlimited on restoring San Mateo Creek. Reviewed files on San Mateo Creek and Santa Margarita River.

Holmgren, Mark. University of California Santa Barbara, Museum of Zoology. pers. comm. 1/18/95. Has only a teaching collection.

Humboldt State University. USFWS, Fishery Cooperative Unit. Library search.

Humboldt State University. Library search, Humboldt Room, depository for NMFS steelhead status review.

Humboldt State University Fish Collection. 5/30/96. Search of museum specimens for southern California steelhead.

Malloy, Mike. Office of Water Resources, Camp Pendleton. 10/24/96. Precipitation updates for the Lake O'Neill, Case Springs, San Mateo Creek, Cristianitios, McGee and Target range 408.

McEwan, Dennis. 1/13/95. CDFG, Sacramento. Authored: "Steelhead Management Plan".

Reck Don. National Marine Fisheries Service, pers. comm. 1/18/95. Regarding the effect of steelhead listing.

Pardy, Linda. pers. comm. 11/27/96. San Diego Water Quality Control Board. Mentioned Bruce Campbell, of San Diego Fly Fishers chairman, caught trout in Santa Margarita River in 1986. Provided response to comments regarding the cold water designation and beneficial use of southern California streams. Mentioned Florence Shipek as a source to contact.

Parmenter, Steve. pers. comm. 2/1/95. CDFG, Bishop, CA. Wild Trout Program. Coordinated Camp Pendleton habitat typing field work. Provided TempMenter data from the San Mateo Creek, below Fisherman Camp. Conducted electro-shocking surveys on San Mateo Creek in 1994.

Reese, Devan. pers. comm. 2/12/96. USFS, Pacific Southwest Range & Experimental Sation. Worked with Dan Holland on Base, arroyo toad and trout predation question.

Sommarstrom, S., pers. comm. 4/96. Private consultant. Wrote Camp Pendleton report: Multiple Land Use Management Plan. 1995.

Sevgal, Jeff. Los Angeles County Natural History Museum. pers. comm. 1/17/95. No steelhead specimens from southern California.

San Diego Historical Society. 12/02/96. Search for references to trout and salmon runs in San Diego County and use by Native Americans in their diets. Notes from interview with Mauricio "Sonny" Magante, a Native American from the Pauma Reservation (Oral History Program) and early maps of streams on Base.

Shelton, Sally, Director. San Diego Natural History Museum. pers. comm. 1/17/95. No fish collection.

Woodhouse, Charles, Director of Zoology, Santa Barbara Natural History Museum. pers. comm. 1/17/95. All marine fish species.

Newspapers contacted:

San Diego Union
Sun Post Reporter
Orange County Register
North County Times
Temecula California
Fallbrook-Enterprise

Newspaper Articles Reviewed:

Los Angeles Press Release, 3 July, 1962. Trout fingerlings stocked in four southland streams. (CDFG stream survey files).

Los Angeles Press Release, 5 May 1964. Redeye bass stocked in Santa Margarita. (CDFG 1932-1952).

Los Angeles Times. 17 Feb. 1978. Growing hatchery provides anglers with trout.

Los Angeles Times. 3 Sept. 1981. Robert Weiss, Dried creek may be cemetery for trout.

Los Angeles Times. 24 Sept. 1986. Judy Pasternak, Steelhead trout have returned to Southern California, tests show.

Los Angeles Times. 13 Nov. 1986. State takes steps to protect steelhead trout.

Los Angeles Times. 11 Nov. 1988. Stewart Allen, Malibu's steelhead are up the creek, without a ladder, Special Feature.

Los Angeles Times. 1 May 1989. Plan would mean steady flow for Santa Margarita River.

Santa Ana Daily Register. (now the Orange County Register) 18 May 1916. Trout this year larger than in 1915, is verdict.

Santa Ana Daily Register. 23 March 1916. Banner season for trout is predicted for county, by Victor Walker.

The San Diego Union. 13 Nov. 1880. A list of the fishes of San Diego County, CA. Presented by Miss Rosa Smith. pg 4:3-4. (#59. Salmo iridea- Brook trout from Pala near Smith Mtn)

The San Diego Union. 27 June 1885. The Silver Trout.

The San Diego Union. 14 Sept. 1893. Trout for San Diego. (45,000 trout shipped from Sisson Hatchery to the back country)

The San Diego Union. 25 April 1897. Marine Intelligence. (Silver Trout spotted in Mission Bay)

The San Diego Union. 24 May 1936. History of trout plants in San Diego County.

The San Diego Union. 3 Jan. 1964. Fishin' with ear, nose: giant rainbows hide behind brushy barricade. pg 6-10. (Note: photo of San Margarita River above Fallbrook with typical riparian before floods).

The San Diego Union. 28 Feb. 1965. Stream trout limit now 10. (Report of steelhead and silver salmon taken inside harbor)

The San Diego Union. 2 Feb. 1966. State trout plant policy not in step with times.

The San Diego Union. 27 April 1966. Outdoor Notebook. (200 lbs/ 1000 trout planted in San Margarita River at Willow Glen Rd. above Fallbrook)

The San Diego Union. 19 April 1995. Santa Margarita River, by Scott La Fee. Section E1, and E12.

The San Diego Union. 14 October 1954. (from Hubbs papers, MC5, 70/37) photo of three pound trout caught in San Luis Rey River below Henshaw dam.

San Diego Fly Fishers Newsletter: May 1995. Flyfishing the Rio Santo Domingo in Mexico, by Jim Brown.

APPENDIX B

Reference sources cited numerically in Table 4 through Table 8.

1. Newspaper article: Santa Ana Daily Register. (now Orange County Register) dated 18 May 1916. "Trout this year larger than in 1915, is verdict".

2. Newspaper article: Santa Ana Daily Register. (23 March 1916). "Banner season for trout is predicted for county" by Victor Walker.

3. (UMMZ) University of Michigan, Museum of Zoology, Fish Collection. 1996. Internet Search of *Salmo gairdneri* in California. Catalog #132968, 132967, 132964, and 132957.

4. California Dept. of Fish & Game. Fish stocking record for San Mateo Creek: August 7, 1939. From stream survey files, Region 5, Long Beach Library.

5. Letter from Willard Jarvis, Senior Fisheries Biologist, to Bureau of Fish Conservation (USFWS) summarizing observations on Camp Pendleton streams, dated June 15, 1946. Located in stream survey files for San Mateo Creek, CDFG Long Beach Library.

6. California Department of Fish and Game. 1932-1979. Stream survey files: Fern Creek, tributary of De Luz Creek 1932; De Luz Creek 1942; San Mateo Creek 1946, 1947, and 1950; Fletcher Creek, tributary to North Fork San Onofre Creek 1950; including stocking records and field notes. Region 5, Long Beach Library.

7. CDFG. 1979. Stream inventory by Linda Ulmer and Gwen Lattin. Long Beach Library.

8. CDFG. 1996a. Mojave River Hatchery Stocking Records for San Mateo Creek and San Margarita River from 1954-1983.

9. Giusti, Mike. per. comm. 1996. CDFG biologist, Chino. Native fish surveys in southern California.

11. Andrews, Stanley. 1933. Trout plants in San Diego County, compilation of field notes from 1917 to 1933. Copied from the files of Dr. David Jessup Sr., La Mesa, CA, pp 49.

12. Los Angeles Press Release: 3 July 1962. "Trout fingerlings stocked in four southland streams". (CDFG 1932-1952).

13. Los Angeles Press Release: 5 May 1964. "Redeye bass stocked in Santa Margarita". (CDFG 1932-1952).

14. U.S. Marine Corps. June 26 1969. Fishery stocking report from Camp Pendleton Natural Resources Section (Wildlife). Camp Pendleton, CA.

15. U.S. Marine Corps. 1994. Camp Pendleton. Fish management log from Oct. 20, 1970 to Dec. 6, 1973. R.B. Freeman (Unpublished). 121 pp.

16. Bureau of Sport Fisheries and Wildlife. 1974. Annual Project Report, Camp Pendleton Fishery Management Program by Gary Rankel, Las Vegas, Nevada. (In USFWS Pulgas Lake historical file).

17. U.S. Marine Corps. 1974. Film Release. Stocking salmon at Camp Pendleton: Official U.S. Marine Corps Film. Released by Department of Defense, March 11, 1974. Release No. 15-74.

18. Bruce Campbell, San Diego Fly Fishers (SDFF) chairman, mentioned to Linda Pardy of the California Regional Water Quality Control Board-San Diego Region, that he had caught trout in 1986 on the upper San Margarita River.

19. Dan Ryan and John Waters, local fishermen who caught steelhead and trout in San Mateo, San Juan, Trabuco, De Luz creeks, and San Luis Rey River from 1932-1942. Interviewed by Allan Greenwood (San Diego Trout) on June 11, 1997. USFWS received a written copy of the transcript from the interview with Mr. Waters.

20. Richard Kramer, retired CDFG game warden who worked on the streams mentioned in this report in the 1940's. Interviewed by Allen Greenwood, San Diego Trout, on 6/18/97. Also, interviewed and quoted in (Woelfel 1991).

21. CDFG. San Mateo Creek stream survey: July 27 & 28, 1996. Draft report from Steve Parmenter. Bishop, CA. 2 pp.

22. CDFG. 1940. Department of Natural Resources, Division of Fish and Game. Field correspondence from: D.A. Claton; to: Bureau of Fish Conservation. Survey of Orange County Streams. February 11, 1940.

23. Maytorena, Marty. 5/7/1997. CDFG game warden for Orange County. Recalled stocking brown trout from Fillmore Hatchery in the San Mateo Creek 1983-1985.

APPENDIX C

Result of computer search of the Scripps Institute of Oceanography Fish Collection, La Jolla, CA. for *Salmo gairdneri*.

Scripps Institute of Oceanography Fish Collection, La Jolla, Ca.
04/25/96 Computer Search

For Salmo gairdneri

	Collection	Qty	Size (mm)	Status	Location	Latitude	Longitude	Depth Cap.
	SIO 44-1	2	0	G	Fountain Crk, trib. to Arkansas River	38^40.0'N	104^30.0'W	0-2 ft
	SIO 45-81	5	135-270	G	headwaters of Rio San Rafael, Mexico	31^37.0'N	115^37.4'W	
	SIO 48-212	2	0	D	Merced River: W boundary of Yosemite Park	37^40.0'N	119^45.0'W	to 2 ft
	SIO 48-213	2	0	G	Merced River: ca 0.5 mi below Cascade Creek	37^40.0'N	119^45.0'W	to 4 ft
	SIO 48-214	5	0	G	Merced River: ca 0.1 mi above Sentinel Bridge	37^40.0'N	119^45.0'W	to 3 ft
	SIO 49-114	2	128-154		Rio Gavilan: 7 mi SW of Pacheco	29^00.0'N	105^00.0'W	
	SIO 49-121	10	0		Vancouver Island: French Creek	49^23.0'N	124^27.0'W	
	SIO 50-154	1	0		Alamo Creek, trib. to Cuyama River	37^42.0'N	121^55.0'W	
	SIO 52-80	5	0	D	Whiskey Creek, trib. to Crowley Lake	37^37.0'N	118^44.0'W	to 2 ft
	SIO 52-81	2	0	D	Hilton Creek mouth	36^31.0'N	117^57.0'W	
	SIO 53-100		0	D	W Fork of Mojave River, below juntion	35^06.0'N	116^04.0'W	
C-1	SIO 56-54	1	166		Highland Canal, branch of All -American Canal	32^50.0'N	115^00.0'W	
	SIO 56-55	1	171		All-American Canal at Drop 2	32^50.0'N	115^00.0'W	
	SIO 58-387	1	0		Horseshoe Lake at campground	40^28.4'N	121^19.9'W	
	SIO 60-490	2	111-145		Smith Creek	34^14.0'N	119^16.0'W	
	SIO 60-493	1	231		Yosemite National Park, Emeric Lake	37^45.0'N	119^35.0'W	
1961	**SIO 61-29**	**1**	**525**		**3 mi N of Rosarito Beach, Mexico**	**32^23.0'N**	**117^04.2'W**	**60yds offshore**
	SIO 61-443	20	25-137		Snaking River at Quesnel, trib. to Nazko River	53^07.0'N	123^34.0'W	
	SIO 63-270	1	44		Mackinac Straits, Green's Creek	45^49.0'N	084^42.0'W	
	SIO 77-81	4	110-130		Atnarko River, Stuie	52^22.0'N	126^02.0'W	
	SIO 80-17	2	148-149		San Simeon Creek, San Luis Obispo	35^39.0'N	121^11.0'W	2 ft
	SIO 80-93	2	75-75		Canterbury Province, Rakaia Drainage	44^00.0'S	171^45.0'E	to 2 ft
1980	**SIO 80-273**	**1**	**409**		**Ocean Beach, N of Pier, San Diego**	**32^46.0'N**	**117^13.0'W**	**on beach**
	SIO 83-104	3	180-200		Big Meadow Campground, Rock Creek	37^55.0'N	120^58.0'W	surface

For Oncorhynchus mykiss

SIO 49-121	1	37	Vancouver Island: Mill Stream	49^08.0'N	123^54.0'W	

For Salmo irideus

0

APPENDIX D

Habitat Typing excerpt from CDFG Habitat Restoration Manual (Flosi and Reynolds 1994)

HABITAT TYPING

The habitat typing procedure presented is a standardized methodology that physically describes 100 percent of the wetted channel. It is a composite of systems principally developed or modified by other investigators and compiled in part by Trinity Fisheries Consulting on contract to DFG.

Habitat types are described according to location, orientation, and water flow. The attributes distinguishing the various habitat types include over-all channel gradient, velocity, depth, substrate, and the channel features responsible for the unit's formation.

A basin-level habitat inventory is designed to produce a thorough description of the physical fish habitat. Basin-level habitat classification is on the scale of a stream's naturally occurring pool-riffle-run units. The length of a habitat unit depends on stream size and order. For basin-level habitat inventory, homogeneous areas of habitat that are equal or greater in length than one wetted channel width are recognized as distinct habitat units.

The information provided by habitat and channel typing, and biological information collected during spawning surveys and/or juvenile rearing surveys aids in determining if critical habitat needs of a target species are lacking, and if there are areas where improvements can be made.

There are four levels of classification used to describe physical fish habitat. Each higher level in the sequence includes more descriptive categories of habitat types (Figure 10). Level I categorizes habitat into riffles or pools. Level II categorizes riffles into riffle or flatwater habitat types, for a total of three types (riffle, pool, and flatwater). Level III further differentiates riffle types on the basis of water surface gradient (riffle or cascade), and pool types according to their location in the stream channel (main channel, lateral scour, or backwater). At level IV, pools are categorized by the cause of formation (obstruction, blockage, constriction, or merging flows); riffles are categorized by gradient, and cascades by gradient and substrate type; and flatwaters are categorized by depth and velocity. Level IV habitat types are the 24 habitat types listed below.

Prior to conducting an inventory, the level of data collection necessary to meet the needs of the investigation should be established. Habitat typing at level IV will provide the greatest detail and the most complete description of existing habitat. This data can later be aggregated into broader levels of habitat classification if detail is found to be excessive.

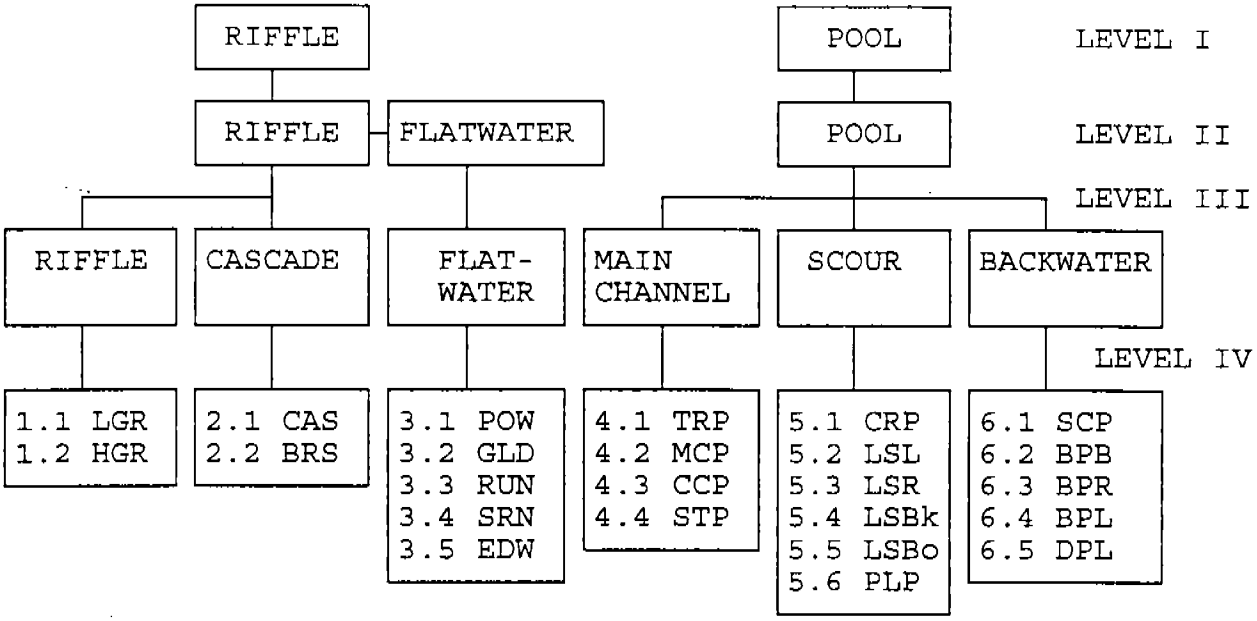


Figure 10. Habitat types hierarchy.

Generally a stream will not contain all 24 habitat types. The mix of habitat types will be reflective of the overall channel gradient, flow regime, cross-sectional profile, and substrate particle size. Basins that exhibit a wide range in channel gradient will also have a broad mix of habitat types. Stratifying a basin by channel types helps to predict the location of certain habitat types.

Project-level habitat typing is used to evaluate and quantify changes in habitat as the result of fish habitat restoration/enhancement projects. It will provide insight on the relationship between channel features and habitat development. For project-level habitat typing, the minimum size of a habitat unit is equal to the width of the wetted stream channel. For a more detailed habitat analysis, the units can be reduced. The habitat unit size used depends on the nature and objective of the particular study. Regardless of unit size, Level IV habitat types should be used.

Habitat typing is intended to yield detailed information that can be used for fisheries management. Basin-wide habitat typing can provide a variety of data. Some important applications are:

- Physically describe 100 percent of the habitat in a basin.
- Provide baseline data to evaluate habitat responses to restoration efforts.
- Facilitate restoration planning and fisheries management.
- Determine transect locations for Instream Flow Incremental Methodology (IFIM) modeling based on habitat availability and accessibility.

Definition of Habitat Types

The following list of habitat types and their hierarchy has been adapted from the original system developed by Bisson, et al. (1982), modified by Decker, Overton, et al. (1985), and Sullivan (1988).

Level I Habitat Types:

RIFFLE:
(Riffle, Cascade, Flatwater)
POOL:
(Main Channel Pool, Scour Pool, Backwater Pool)

Level II Habitat Types:

RIFFLE:
(Low-Gradient Riffle, High-Gradient Riffle, Cascade, Bedrock Sheet)
FLATWATER:
(Pocket Water, Run, Step Run, Glide, Edgewater)
POOL:
(Plunge Pool, Mid-Channel Pool, Dammed Pool, Step Pool, Channel Confluence Pool, Trench Pool, Lateral Scour Pool Root Wad Enhanced, Boulder Formed, Bedrock Formed, and Log Enhanced, Corner Pool, Secondary Channel Pool, Backwater Pool Boulder Formed, Root Wad Formed, and Log Formed)

Level III and Level IV Habitat Types:

The three or four letter abbreviations in parentheses, (***), are the standardized abbreviations adopted by DFG. The three digit numbers in brackets, [*.*], are the standardized numbers adopted by DFG. The numbers in braces, {**}, are the numbers listed in the Pacific Southwest Region Habitat Typing Field Guide, USDA-USFS.

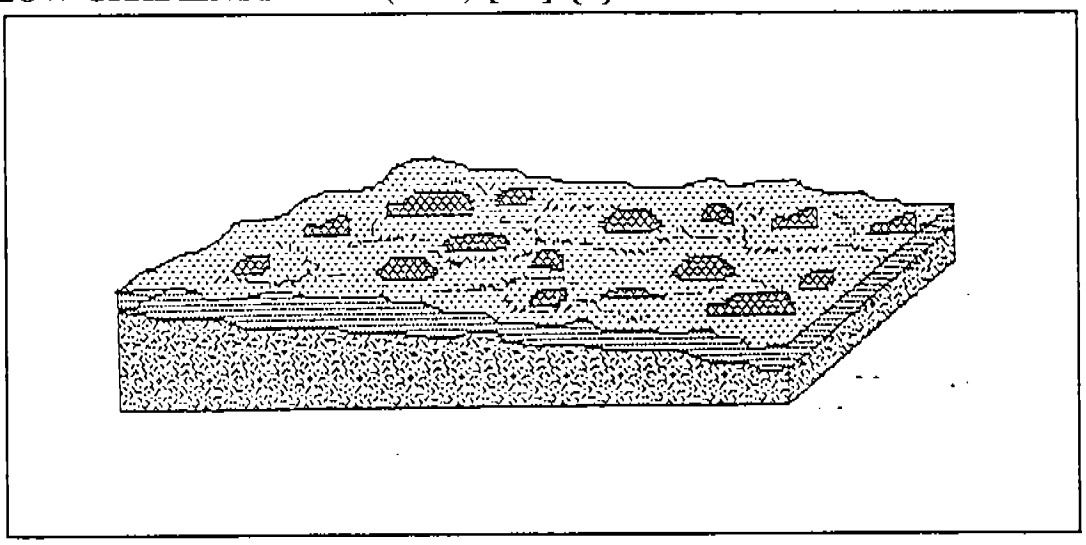
RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{1}
High Gradient Riffle	(HGR)	[1.2]	{2}
CASCADE			
Cascade	(CAS)	[2.1]	{3}
Bedrock Sheet	(BRS)	[2.2]	{24}

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 POOL			
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 POOL			
Corner Pool	(CRP)	[5.1]	{22}
L. Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
L. Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
L. Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
L. Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{9}
BACKWATERPOOLS			
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}
DRY STREAMBED			
Dry	(DRY)	[7.0]	

Level IV Habitat Type Descriptions:

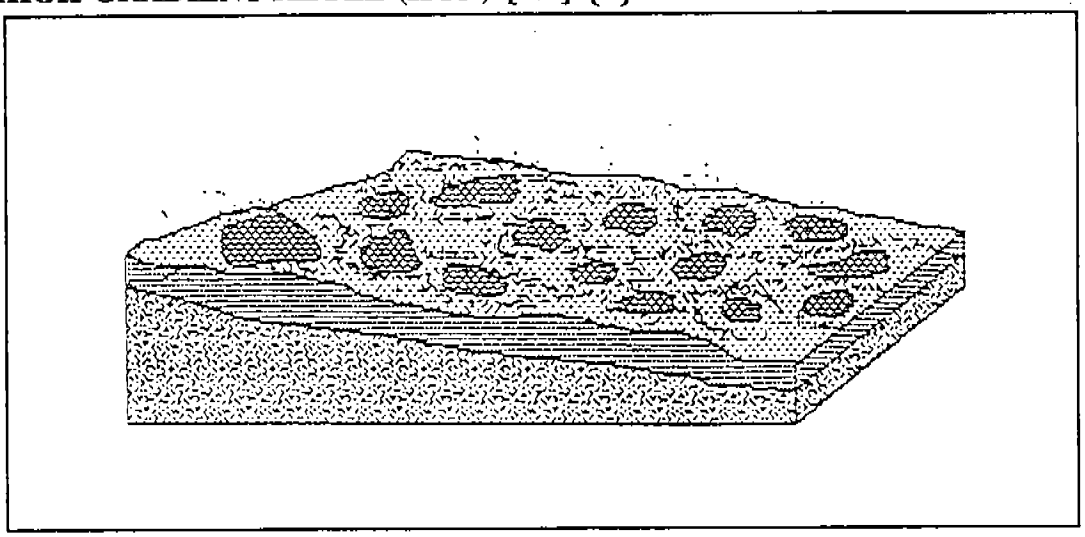
The following habitat type descriptions are taken from the Pacific Southwest Region Habitat Typing Field Guide, USDA-USFS.

LOW-GRADIENT RIFFLE (LGR) [1.1] {1}



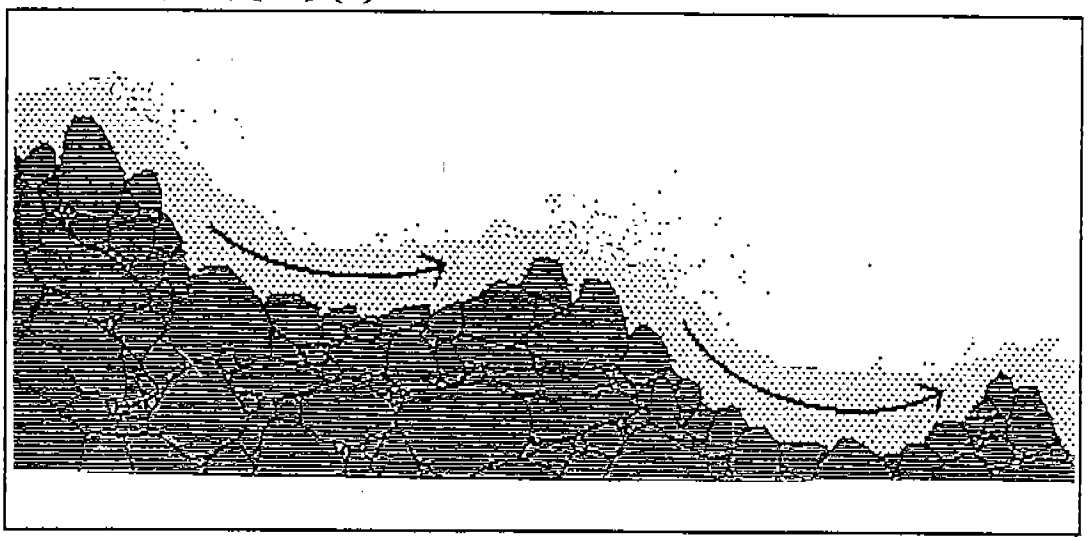
Shallow reaches with swiftly flowing, turbulent water with some partially exposed substrate. Gradient < 4%, substrate is usually cobble dominated.

HIGH-GRADIENT RIFFLE (HGR) [1.2] {2}



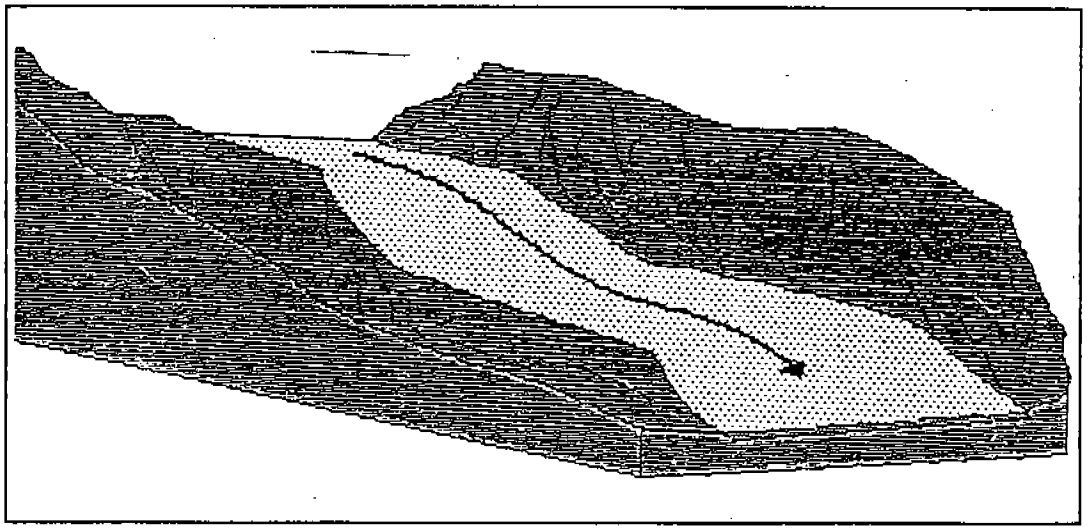
Steep reaches of moderately deep, swift, and very turbulent water. Amount of exposed substrate is relatively high. Gradient is > 4%, and substrate is boulder dominated.

CASCADE (CAS) [2.1] {3}



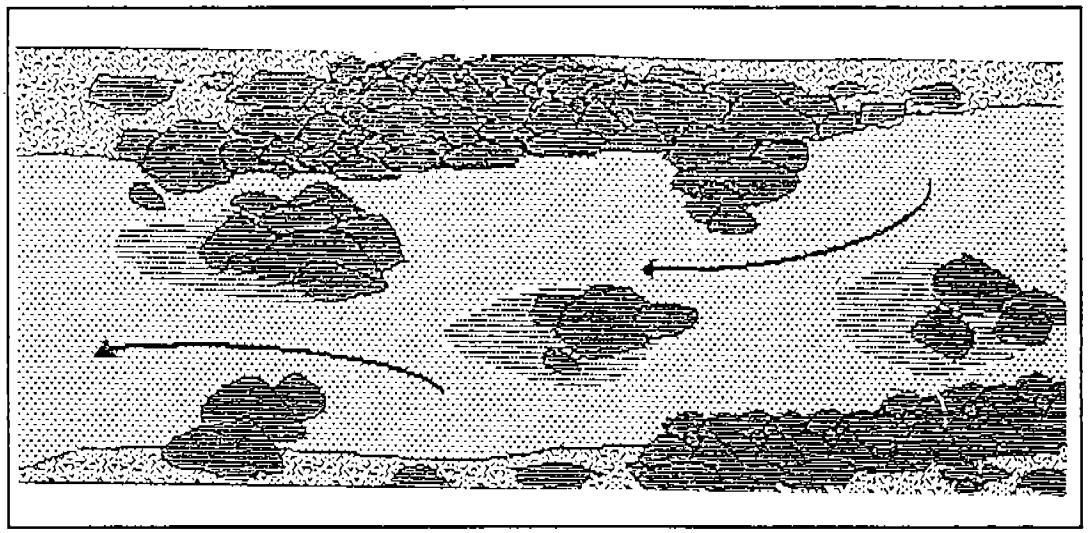
The steepest riffle habitat, consisting of alternating small waterfalls and shallow pools. Substrate is usually bedrock and boulders.

BEDROCK SHEET (BRS) [2.2] {24}



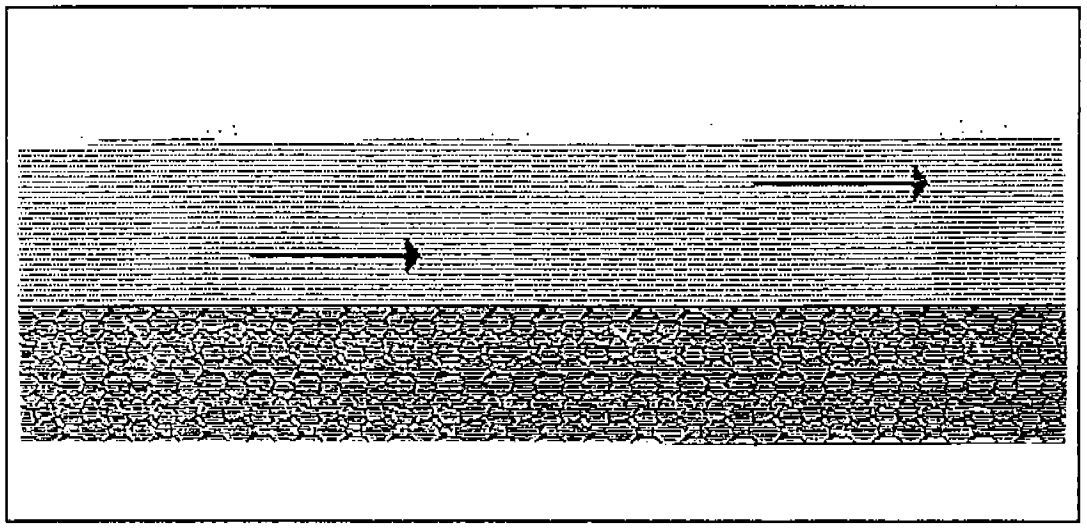
A thin sheet of water flowing over a smooth bedrock surface. Gradients are highly variable.

POCKET WATER (POW) [3.1] {21}



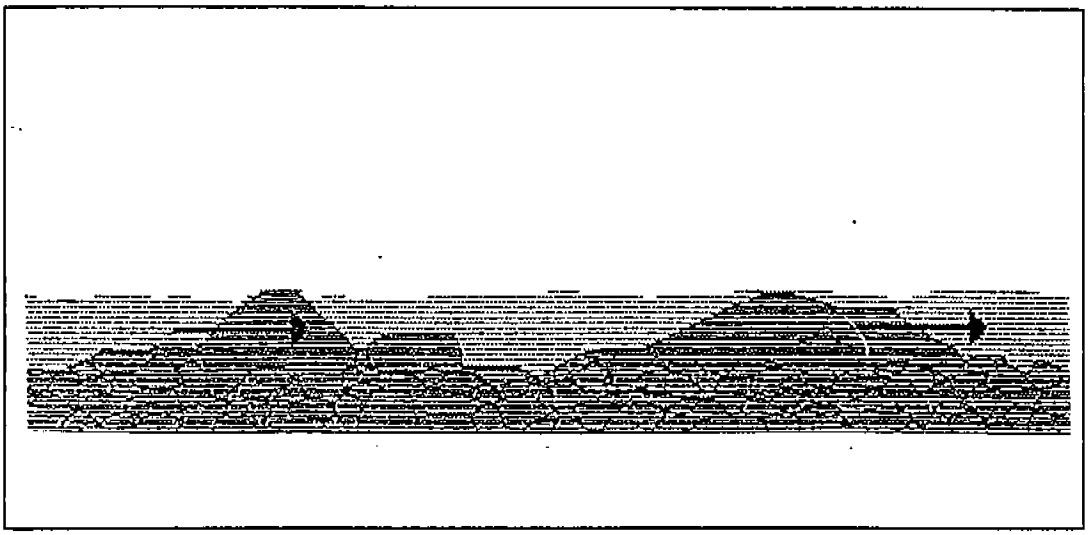
A section of swift-flowing stream containing numerous boulders or other large obstructions which create eddies or scour holes (pockets) behind the obstructions.

GLIDE (GLD) [3.2] {14}



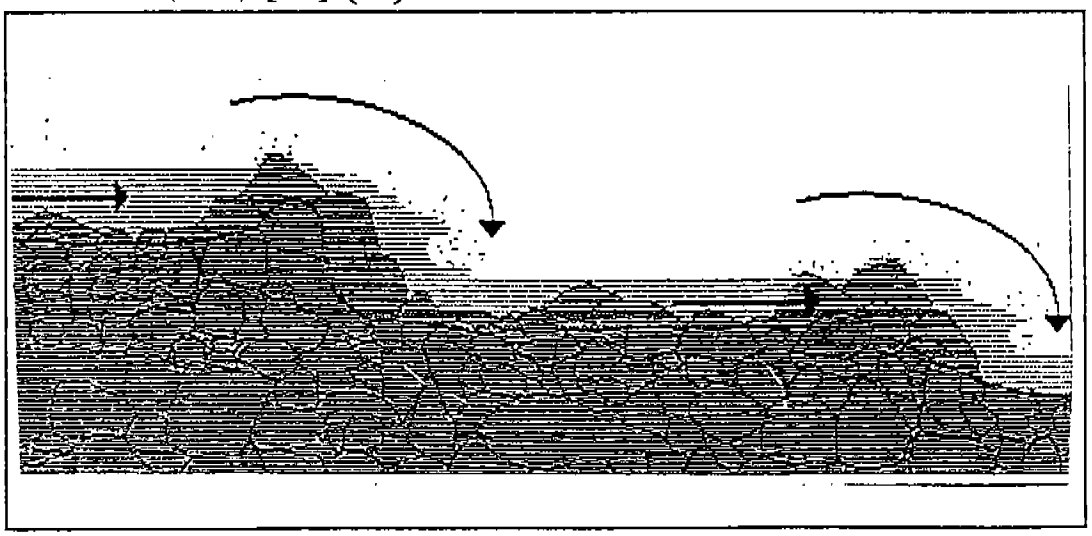
A wide, uniform channel bottom. Flow with low to moderate velocities, lacking pronounced turbulence. Substrate usually consists of cobble, gravel, and sand.

RUN (RUN) [3.3] {15}



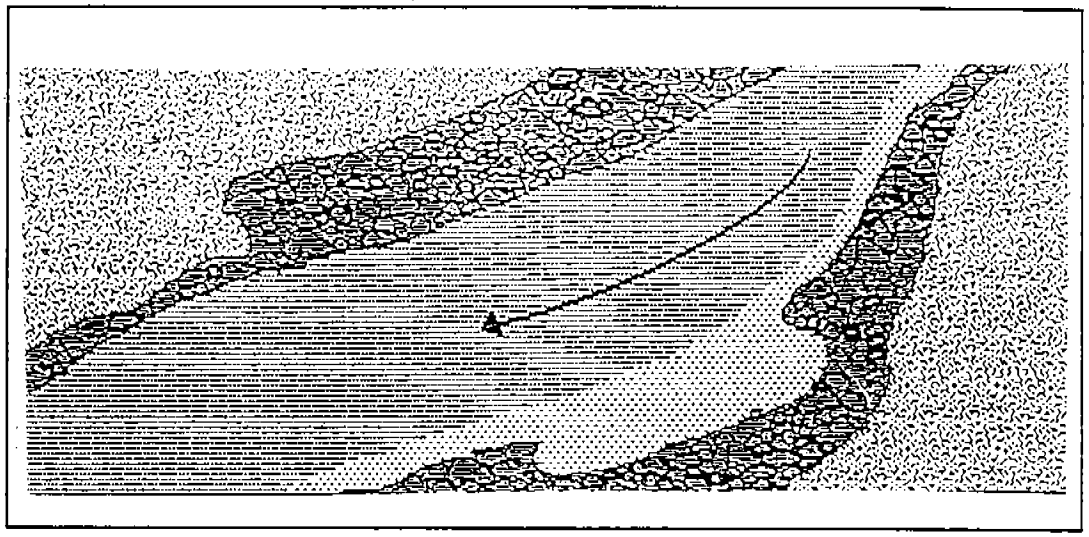
Swiftly flowing reaches with little surface agitation and no major flow obstructions. Often appears as flooded riffles. Typical substrate consists of gravel, cobble, and boulders.

STEP RUN (SRN) [3.4] {16}



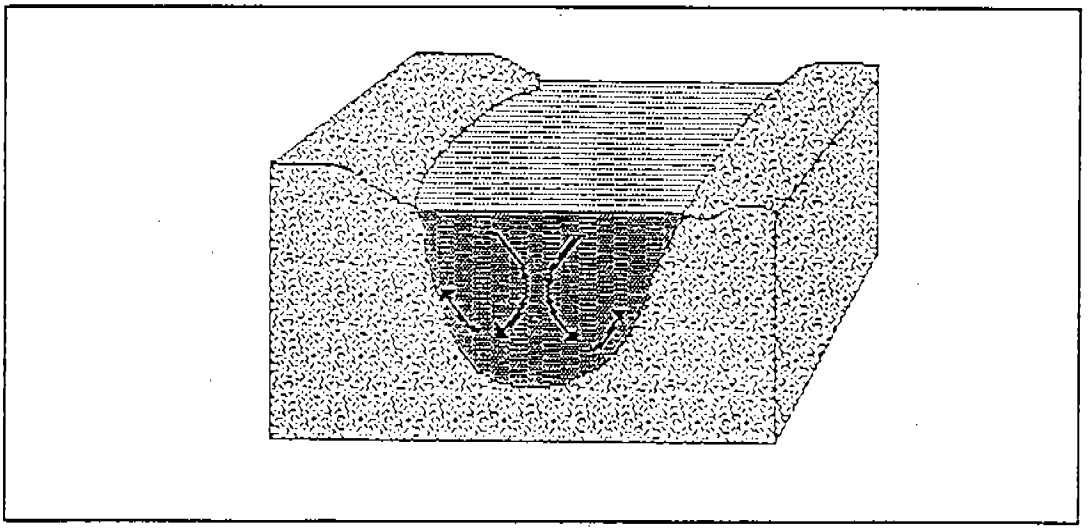
A sequence of runs separated by short riffle steps. Substrate is usually cobble and boulder dominated.

EDGEWATER (EDW) [3.5] {18}



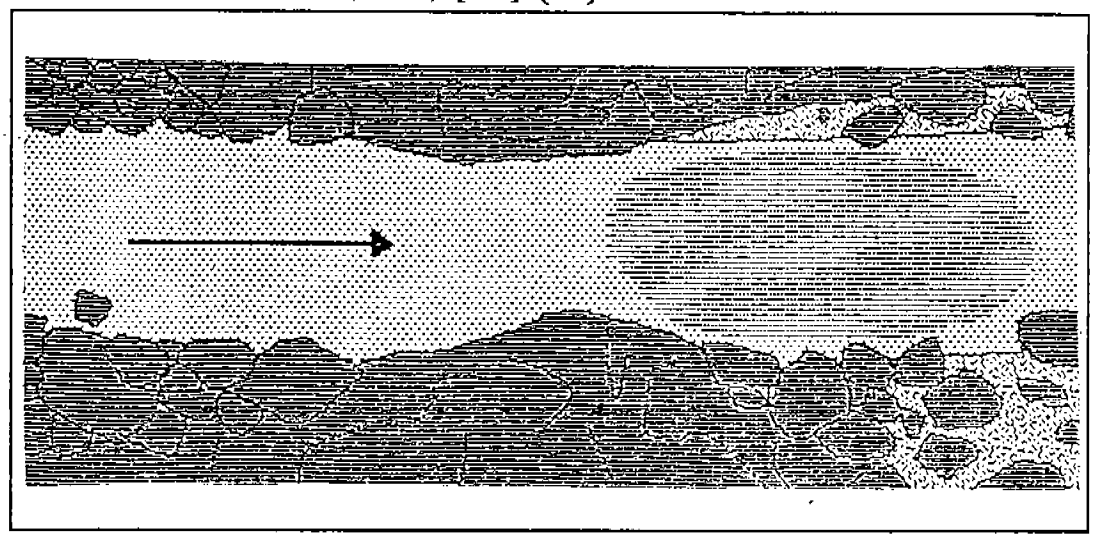
Quiet, shallow area found along the margins of the stream, typically associated with riffles. Water velocity is low and sometimes lacking. Substrate varies from cobbles to boulders.

TRENCH POOLS (TRP) [4.1] {8}



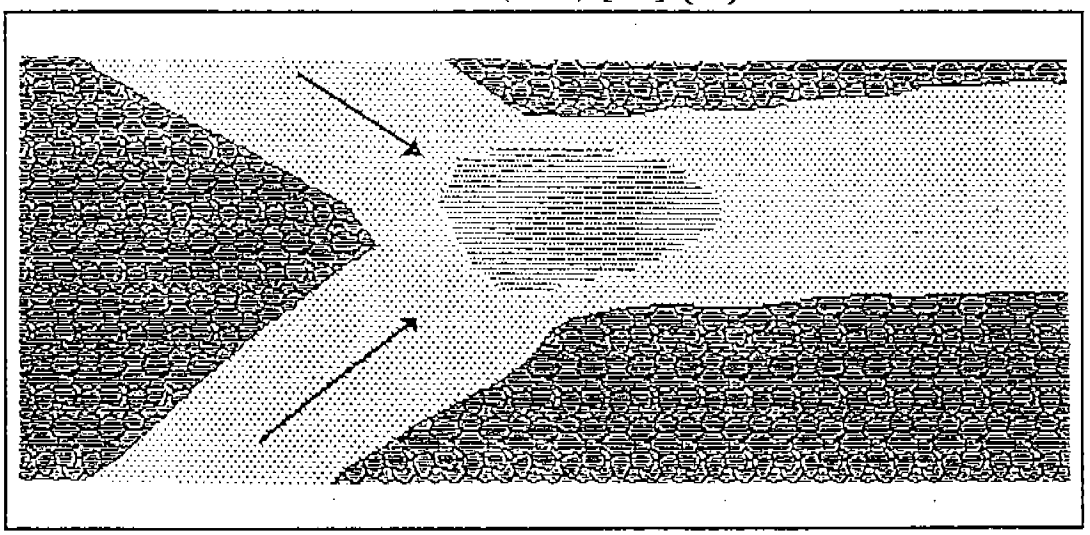
Channel cross sections typically U-shaped with bedrock or coarse grained bottom flanked by bedrock walls. Current velocities are swift and the direction of flow is uniform.

MID-CHANNEL POOL (MCP) [4.2] {17}



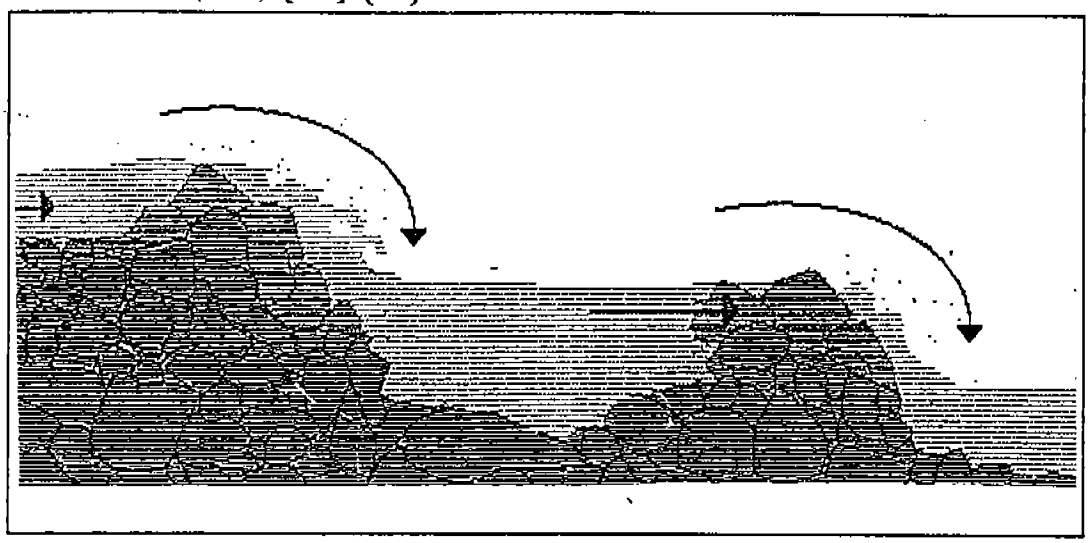
Large pools formed by mid-channel scour. The scour hole encompasses more than 60% of the wetted channel. Water velocity is slow, and the substrate is highly variable.

CHANNEL CONFLUENCE POOL (CCP) [4.3] {19}



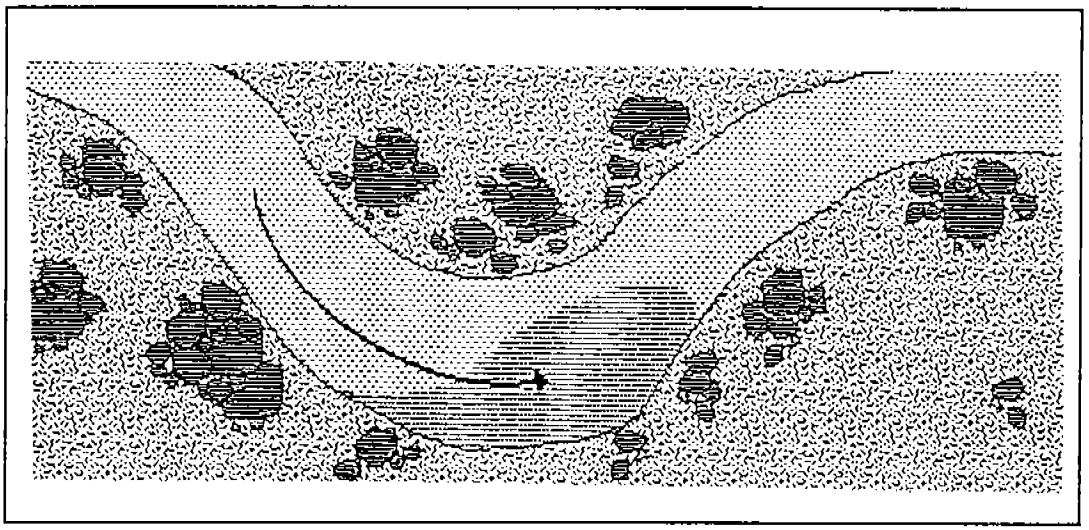
Large pools formed at the confluence of two or more channels. Scour can be due to plunges, lateral obstructions or scour at the channel intersections. Velocity and turbulence are usually greater than those in other pool types.

STEP POOL (STP) [4.4] {23}



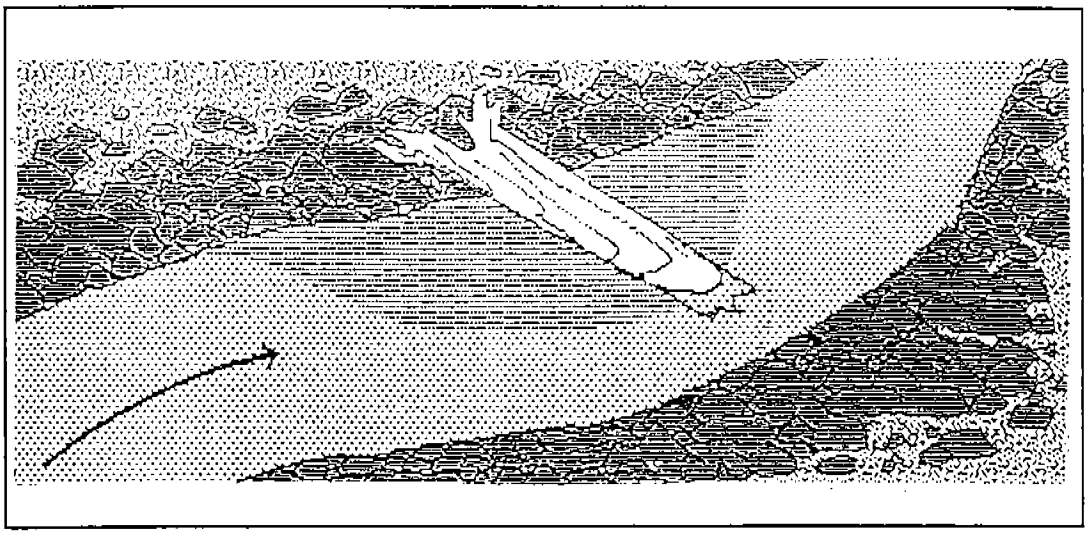
A series of pools separated by short riffles or cascades. Generally found in high-gradient, confined mountain streams dominated by boulder substrate.

CORNER POOL (CRP) [5.1] {22}



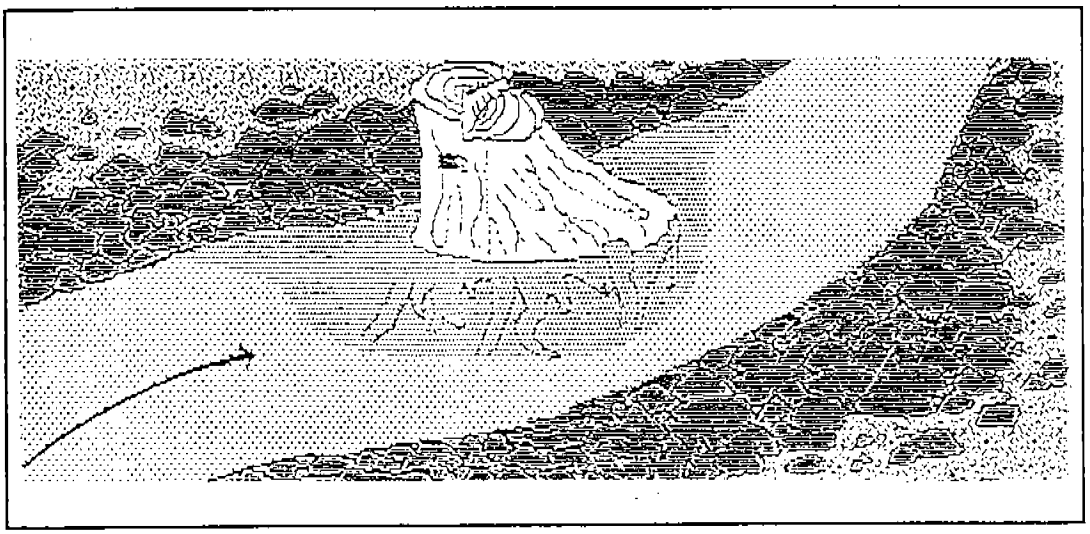
Lateral scour pools formed at a bend in the channel. These pools are common in lowland valley bottoms where stream banks consist of alluvium and lack hard obstructions.

LATERAL SCOUR POOL - LOG ENHANCED (LSL) [5.2] {10}



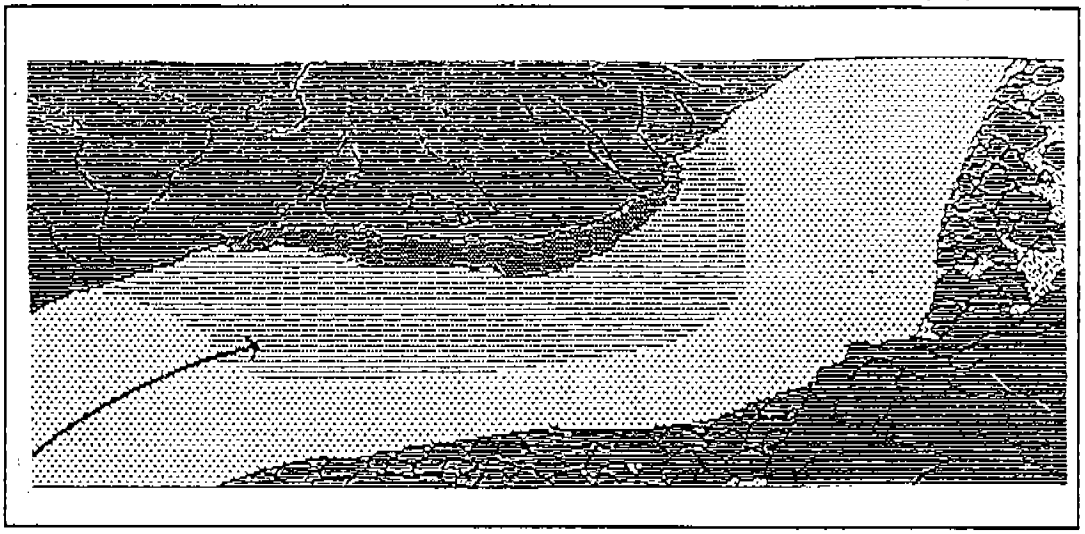
Formed by flow impinging against a partial channel obstruction consisting of large woody debris. The associated scour is generally confined to < 60% of the wetted channel width.

LATERAL SCOUR POOL ROOT WAD ENHANCED (LSR) [5.3] {11}



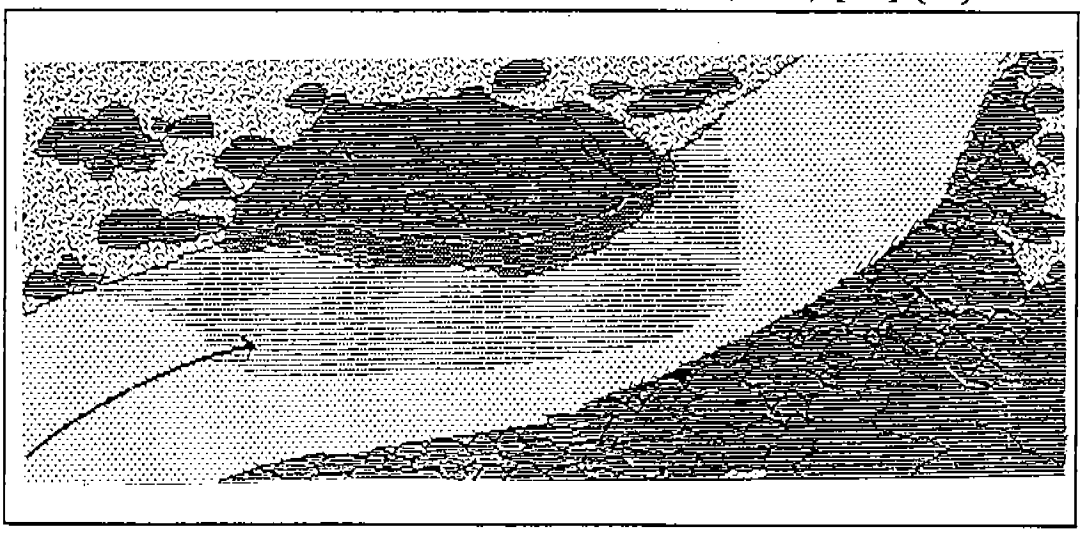
Formed by flow impinging against a partial channel obstruction consisting of a root wad. The associated scour is generally confined to < 60% of the wetted channel width.

LATERAL SCOUR POOL - BEDROCK FORMED (LSBk) [5.4] {12}



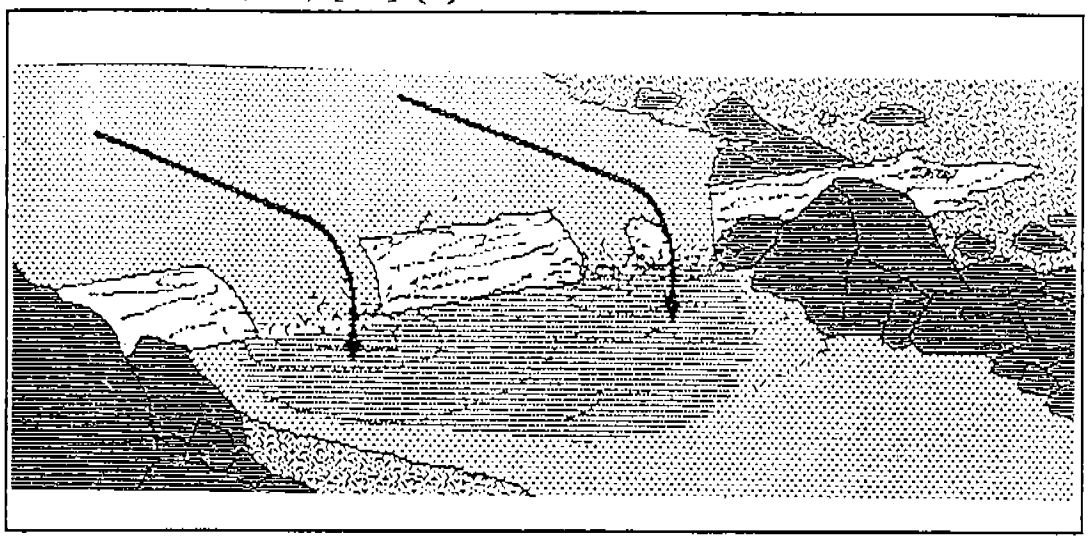
Formed by flow impinging against a bedrock stream bank. The associated scour is generally confined to < 60% of the wetted channel width.

LATERAL SCOUR POOL - BOULDER FORMED (LSBo) [5.5] {20}



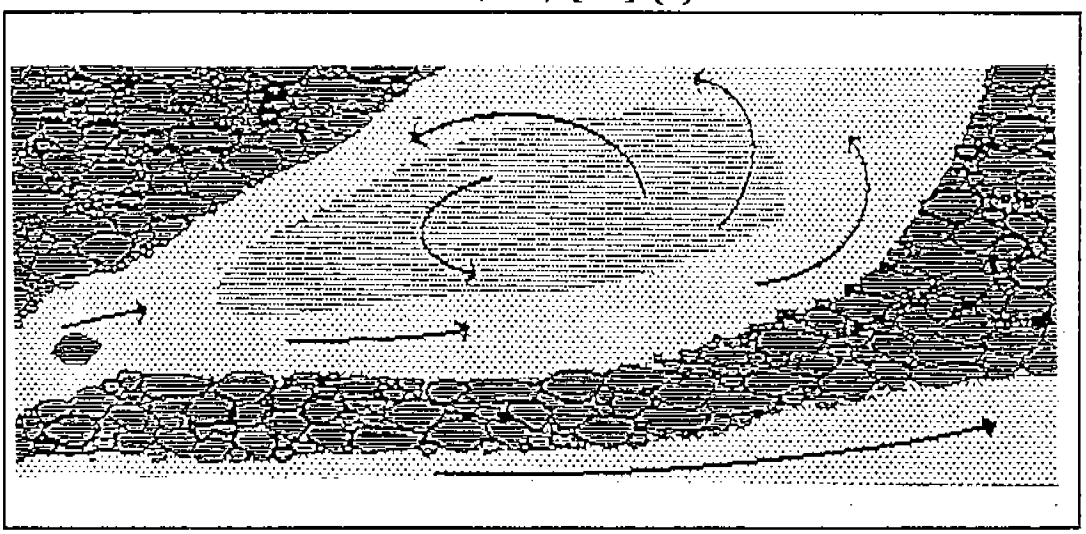
Formed by flow impinging against a partial channel obstruction consisting of a boulder. The associated scour is generally confined to < 60% of the wetted channel width.

PLUNGE POOL (PLP) [5.6] {9}



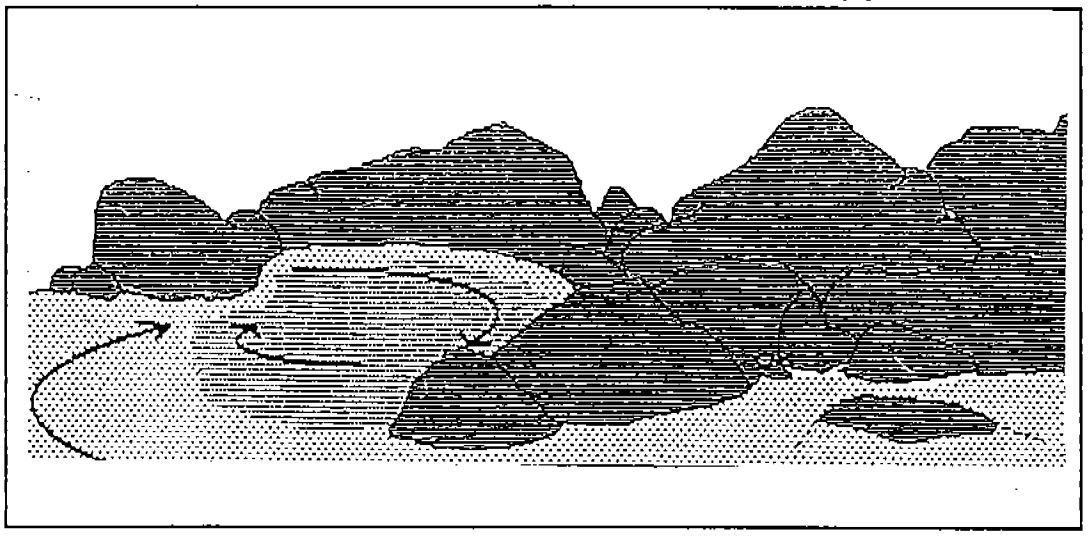
Found where the stream passes over a complete or nearly complete channel obstruction and drops steeply into the streambed below, scouring out a depression; often large and deep. Substrate size is highly variable.

SECONDARY CHANNEL POOL (SCP) [6.1] {4}



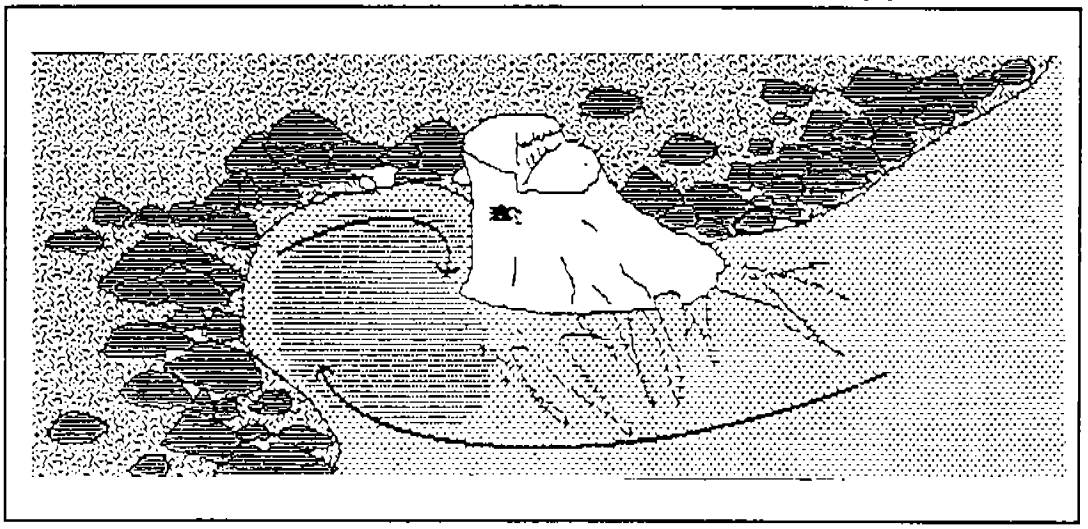
Pools formed outside of the average wetted channel width. During summer, these pools will dry up or have very little flow. Mainly associated with gravel bars and may contain sand and silt substrate.

BACKWATERPOOL - BOULDER FORMED (BPB) [6.2] {5}



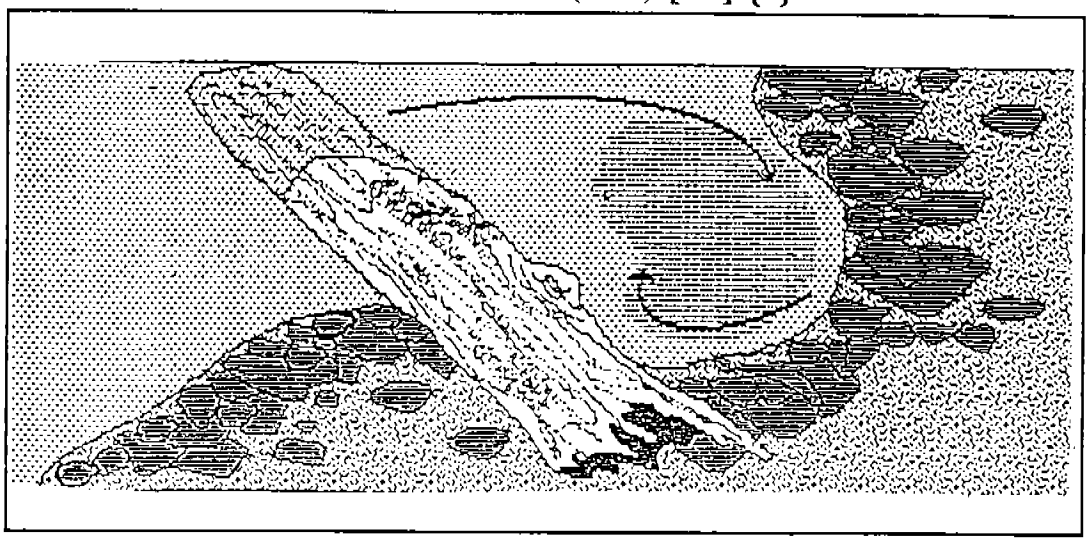
Found along channel margins and caused by eddies around a boulder obstruction. These pools are usually shallow and are dominated by fine-grain substrate. Current velocities are quite low.

BACKWATERPOOL - ROOT WAD FORMED (BPR) [6.3] {6}



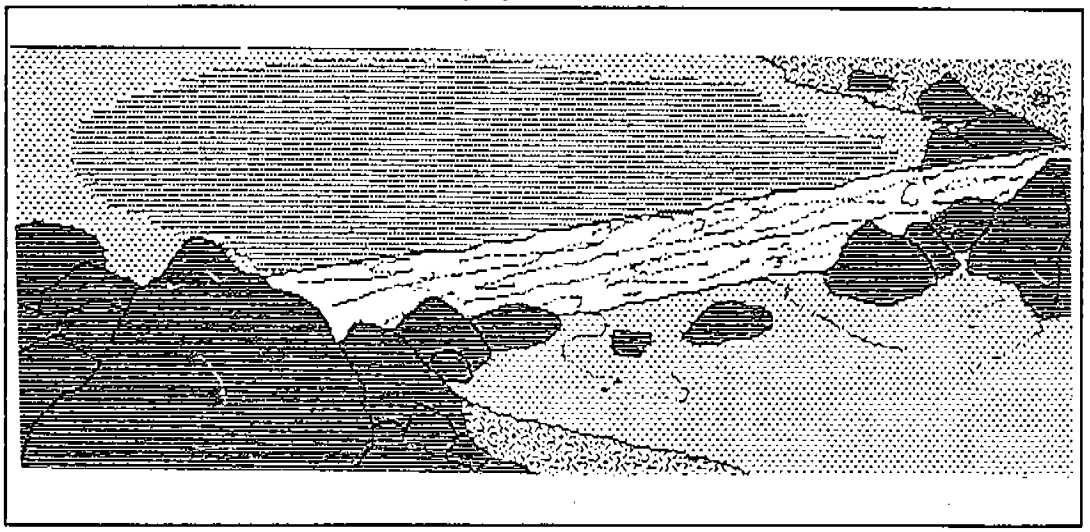
Found along channel margins and caused by eddies around a root wad obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

BACKWATERPOOL - LOG FORMED (BPL) [6.4] {7}



Found along channel margins and caused by eddies around a large woody debris obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

DAMMED POOLS (DPL) [6.5] {13}



Water impounded from a complete or nearly complete channel blockage (debris jams, rock landslides or beaver dams). Substrate tends to be dominated by smaller gravel and sand.

Instream Shelter

Instream shelter within each habitat unit can be rated according to a standard system. This rating system is a field procedure for habitat inventories which utilizes objective field measurements. It is intended to rate, for each habitat unit, complexity of shelter that serves as instream cover or that creates areas of diverse velocities which are focal points for salmonids. In this rating system, instream shelter is composed of those elements within a stream channel that provide protection from predation for salmonids, areas of reduced water velocities in which fish can rest and conserve energy, and separation between territorial units to reduce density related competition. This rating does not consider factors related to changes in discharge, such as water depth.

Instream Shelter Complexity. A value rating can be assigned to instream shelter complexity. This rating is a relative measure of the quantity and composition of the instream shelter.

Value	Instream Shelter Complexity Value Examples:
0	• No shelter.
1	• One to five boulders. • Bare undercut bank or bedrock ledge. • Single piece of large wood (>12" diameter and 6' long) defined as large woody debris (LWD).
2	• One or two pieces of (LWD) associated with any amount of small wood (<12" diameter) defined as small woody debris (SWD). • Six or more boulders per 50 feet. • Stable undercut bank lacking root mass. • A single root wad lacking complexity. • Branches in or near the water. • Limited submersed vegetative fish cover. • Bubble curtain.
3	Combinations of: • LWD/boulders/root wads. • Three or more pieces of LWD combined with SWD. • Three or more boulders combined with LWD/SWD. • Bubble curtain combined with LWD or boulders. • Stable undercut bank with greater than 12" undercut, associated with root mass or LWD. • Extensive submersed vegetative fish cover.

Instream Shelter Percent Cover. Instream shelter percent cover is a measure of the area, of a habitat unit, occupied by instream shelter. The area is estimated from an overhead view.

Instructions for Completing The Habitat Inventory Data Form

1) **Form No.** - Print in the form number. Number the forms sequentially beginning with "01" on the first page and "02" on the second and so on.

2) **Date** - Enter the day's date: mm/dd/yy.

3) **Stream Name** - Print in the stream name.

4) **Legal** - Enter the township, range and section of the stream confluence or from where you started the survey from the USGS quadrangle.

5) **Lat** - Enter the latitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (see Page II-2).

6) **Long** - Enter the longitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (see Page II-2).

7) **Quad** - Enter the name of the 7.5-minute USGS quadrangle on which the confluence of the stream appears.

8) **Surveyors** - Enter the names of the surveyors.

9) **Flow Measurement** - Record the volume at the time of the survey. Record in cubic feet/second.

10) **Channel Type** - Record the channel type determined from completing the Stream Channel Type Worksheet. (see Page III-26)

11) **Reach** - Enter the reach number beginning with 1 for the lowermost channel type in the basin. Each stream channel type change proceeding upstream will be designated by a new stream reach number.

12) **Time** - At the beginning of each page enter the time in military time (24-hour clock).

13) **Water Temperature** - At the beginning of each page record the water temperature to the nearest degree Fahrenheit. Water temperatures are taken in the middle of the habitat unit, within one foot of the water surface.

14) **Air Temperature** - At the beginning of each page record the air temperature to the nearest degree Fahrenheit. Air temperatures are taken in the middle of the habitat unit.

15) **Habitat Unit Number** - Enter the habitat unit number. These numbers are in sequential order, beginning with "001" at the mouth of the stream. When numbering side channels begin with the number of the unit where the split or divide begins, use a new column and entirely fill it out for each adjacent unit, and number it sequentially adding a ".1" or ".2" as appropriate to describe the exact position of units. See the example:

Habitat Unit Number	5	6	6.1	6.2	7
Habitat Unit Type	5.3	1.1			4.2
Side Channel Type			1.1	3.2	

16) **Habitat Unit Type** - Determine the type of habitat unit and enter the appropriate habitat type number code. If the unit is dry, use 7.0 for the habitat type number code.

17) **Side Channel Type** - Determine the type of habitat unit and enter the appropriate habitat type number code.

18) **Mean Length** - Enter the thalweg length of the habitat unit, in feet.

19) **Mean Width** - Measure two or more channel widths within the habitat unit. Calculate and enter the mean width for the habitat unit, in feet.

20) **Mean Depth** - Take several random depth measurements across the unit with a stadia rod. Calculate and enter the mean depth, in feet.

21) **Maximum Depth** - Enter the measured maximum depth for each habitat unit, in feet.

22) **Depth Pool Tail Crest** - Measure the maximum thalweg depth at the pool tail crest, in feet. This measurement is taken only in pool habitat units and is used to determine the pool's residual volume.

23) **Pool Tail Embeddedness** - In the pool tails enter the number code for the percent to which the cobbles are surrounded or covered by fines:

1 = 0 to 25%
2 = 26 to 50%
3 = 51 to 75%
4 = 76 to 100%

24) **Shelter Value** - Enter the number code (0 to 3) that corresponds to the dominant structural shelter type that exists in the unit (Page III-43)

25) **Percent Unit Covered** - Enter the percentage of the unit occupied by the dominant structural shelter. Classify 100 percent of the cover by the types indicated on the form. Note: bubble curtain includes white water.

26) **Substrate Composition** - Enter a "1" for the dominant substrate and a "2" for the co-dominant substrate. Note: changes in the dominant and co-dominant substrate may indicate that the channel type has changed.

27) **Percent Exposed Substrate** - Enter the estimated percentage of the bottom substrate of the unit that is exposed above the water surface.

28) **Percent Total Canopy** - Enter the percentage of the stream area that is influenced by the tree canopy. The canopy is measured using a spherical densiometer at the center of each habitat unit (Appendix M).

29) **Percent Deciduous Trees** - Of the percent total canopy estimate the percent of the canopy consisting of deciduous trees.

30) **Percent Coniferous Trees** - Of the percent total canopy estimate the percent of the canopy consisting of coniferous trees.

31) **Right Bank Composition** - Observed from the water to bankfull discharge level. Enter the number (1 through 4) for the right bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The right bank is the right side of the stream when facing downstream.

32) **Right Bank Dominant Vegetation** - Enter the number (5 through 9) for the right bank dominant vegetation type corresponding to the list located on the lower left hand side of the form. Enter one number only.

33) **Percent Right Bank Vegetated** - Estimate the total percentage of the right bank covered with vegetation from bankfull discharge level to 20 feet upslope.

34) **Left Bank Composition** - Observed from the water to bankfull discharge level. Enter the number (1 through 4) for the left bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The left bank is the left side of the stream when facing downstream.

35) **Left Bank Dominant Vegetation** - Enter the number (5 through 9) for the left bank dominant composition type corresponding to the list located on the lower left hand side of the form. Enter one number only.

36) **Percent Left Bank Vegetated** - Estimate the total percentage of the left bank covered with vegetation from bankfull discharge level to 20 feet upslope.

37) **Comments** - Add comments that are important to that habitat unit such as: 1) the location of tributaries, bridges, culverts, or diversions; 2) the presence of landslides, or barriers; or 3) a change in channel type, etc.

HABITAT INVENTORY DATA FORM Form # ___of___

Date ___/___/___ Stream Name _____ T____R____S____
Lat._____ Long._____ Quad._____
Surveyors _____ Flow _____
Channel Type ____ Reach #____ Time _____ Water Temp _____ Air Temp _____

****

Habitat Unit Number.....										
Habitat Unit Type.....										
Side Channel Type.....										
Mean Length.....										
Mean Width.....										
Mean Depth.....										
Maximum Depth.....										
Depth Pool Tail Crest...										
Pool Tail Embeddedness..										
SHELTER RATING										
Shelter Value.....										
% Unit Covered.....										
% undercut bank.....										
% swd (d<12").....										
% lwd (d>12").....										
% root mass.....										
% terr. vegetation..										
% aqua. vegetation..										
% bubble curtain....										
% boulders (d>10")..										
% bedrock ledges....										
SUBSTRATE COMPOSITION (Select two most dominant compositions)										
Silt/Clay.....										
Sand (<0.08")...										
Gravel (0.08-2.5")...										
Sm Cobble (2.5-5")...										
Lg Cobble (5-10")...										
Boulder (>10")...										
Bedrock.....										
% Exposed Substrate.....										
PERCENT TOTAL CANOPY....										
% Deciduous Trees.....										
% Coniferous Trees.....										
BANK COMPOSITION & VEGETATION (See bank and vegetation types below)										
Rt Bk Composition.....										
Rt Bk Dominant Veg.....										
% Rt Bk Vegetated.....										
Lft Bk Composition.....										
Lft Bk Dominant Veg										
% Lft Bk Vegetated.....										

********** COMMENTS **********

BANK COMPOSITION TYPE
1) Bedrock
2) Boulder
3) Cobble/Gravel
4) Silt/Clay/Sand

VEGETATION TYPES
5) Grass
6) Brush
7) Deciduous Trees
8) Coniferous Trees
9) No Vegetation

Appendix E.

USGS gauge stations in the Santa Margarita River, San Mateo Creek and San Onofre Creek drainages and monthly surface flow totals (acre-feet) for the period of record at gauge station 11046000, 11046300, and 11046310.

USGS gauge stations, drainage area, county and periods of record for the Santa Margarita River, and San Mateo, Cristianitos, San Onofre and Las Flores creeks.

Station #	Station Name	Drainage Area (mi)^2	County	Hydrologic Unit Code	Basin Name	Periods of record
11042800	Warm Springs Cr. Nr Murrieta CA	55.40	Riverside	18070302	Santa Margarita	1987-91, 1992-93
11042900	Santa Gertrudis Cr. Nr Temecula CA	90.16	Riverside	18070302	Santa Margarita	1987-91, 1992-1993
11043000	Murrieta Cr. at Temecula CA	222.00	Riverside	18070302	Santa Margarita	1930-95

Notes: The Warm springs Cr.: Channel was lined by Rancho California Water District in 1991. The water district can discharge into the creek from an automated pump, approximately 0.1 mi upstream from station. Santa Gertrudis Cr: Flow partly regulated by skinner Reservoir. Flow less than 1 cfs from local landscape-irrigation runoff at times bypasses station. Murrieta Cr: Since 1974, flow partly regulated by skinner Reservior. Rancho California Water District can discharge into creek, approximately 0.1 mi upstream, to supplement low flow. Varying amounts of backwater caused by beaver dams during low flow periods.

11042600	Temecula Cr. Below Vail Dam	N/A	Riverside	18070302	Santa Margarita	1977-78
11042631	Pechanga Cr. near Temecula	13.80	Riverside	18070302	Santa Margarita	1987-93
11044000	Santa Margarita R. near Temecula	588.00	Riverside	18070302	Santa Margarita	1923-95

Notes: Construction of Vail Dam completed in 1949. There had been no spill from November 1948 to February 1980, when a 8,000 cfs peak spill occured. Water is currently released down Temecula Cr. for diversion approximately 1 mi. downstream.
Pechanga Cr: No water regulation or diversions upstream from gage station. No flow for many days each year.
Flows at gage station 11044000 have been partly regulated since November 1948 by Vail Lake, and since 1974 by Skinner Reservoir.
Rancho California Water District can discharge into Murrieta Cr. approximately 0.1 mi upstream, to supplement flow.

11044250	Rainbow Cr. near Fallbrook	10.30	San Diego	18070302	Santa Margarita	1989-93
11044300	Santa Margarita River at Fallbrook public utility district sump, near fallbrook.	620.00	San Diego	18070302	Santa Margarita	1989-93
11044350	Sandia Cr. near Fallbrook	21.10	San Diego	18070302	Santa Margarita	1989-93
11044800	De Luz Cr. near De Luz	33.03	San Diego	18070302	Santa Margarita	1992-93

Notes: Rainbow Cr.: No regulation upstream from station. Undetermined amount of water upstream from station used for irrigation by a local nursey. Water is imported for domestic use and irrigation. Flow at the Fallbrook Public Utility District sump has been partly regulated. since November 1948 by Vail Lake and since 1974 by wskinner Reservoir. Sandia Cr.: No regulation or diversions upstream of stations. Also poor flow records. Deluz Cr: No regulation or diversion upstream from station.

11044500	Santa Margarita R. near Fallbrook	644.00	San Diego	18070302	Santa Margarita	1924-80
11044600	Santa Margarita R. Trib near Fallbrook	0.52	San Diego	18070302	Santa Margarita	1961-65
11044900	De Luz Cr. near Fallbrook CA	47.50	San Diego	18070302	Santa Margarita	1951-67, 1989-90
11045000	Santa Margarita R near De Luz Sta. CA	705.00	San Diego	18070302	Santa Margarita	1924-26
11046000	Santa Margarita R A Ysidora CA	740.00	San Diego	18070302	Santa Margarita	1923-26, 1930-93
11042430	Coahuila Cr. Trib at Anza CA	4.90	Riverside	18070302	Santa Margarita	N/A
11045300	Fallbrook Cr. near Fallbrook CA	6.97	San Diego	18070302	Santa Margarita	N/A
11046050	Santa Margarita R. at Mo near Oceanside CA	744.00	San Diego	18070302	Santa Margarita	N/A
11046100	Las Flores Cr. near Oceanside CA.	26.60	San Diego	18070301	Aliso-San Onofre	1951-67, 1969-79
11046200	San Onofre Cr. near San Onofre CA.	34.60	San Diego	18070301	Aliso-San Onofre	1950-67
11046250	San Onofre Cr. at San Onofre CA.	42.23	San Diego	18070301	Aliso-San Onofre	1946-67, 1989-89
11046300	San Mateo Cr. at San Clemente CA.	80.00	San Diego	18070301	Aliso-San Onofre	1952-96
			Note: USGS records to 1967, Camp Pendleton has records 1967-1996			
11046310	San Mateo Cr. near San Onofre CA.	91.90	San Diego	18070301	Aliso-San Onofre	1950-52
11046350	Critianitos Cr. near San Clemente CA.	29.00	San Diego	18070301	Aliso-San Onofre	1950-67
11046370	San Mateo Cr. at San Onofre CA.	132.00	San Diego	18070301	Aliso-San Onofre	1946-67, 1983-85
			Note: Camp Pendleton has good records 1947-1976			

SMR at Yisodora Gauge Station 11046000 (Total acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Year Total
1923						944	88	8	0	0	0	0	
1924	0	0	437	603	235	532	540	19	0	0	0	0	2,366
1925	0	0	165	396	74	73	79	5	0	0	0	0	792
1926	0	0	19	10	1,143	209	14,253	149	22	0	0	0	15,804
1931	5	36	58	236	2,472	469	201	122	44	8	8	3	3,662
1932	24	75	2,823	1,892	31,333	3,590	487	332	99	26	18	28	40,725
1933	98	92	613	2,787	1,584	629	310	176	69	63	58	68	6,548
1934	87	77	368	3,174	526	430	140	76	70	32	24	24	5,028
1935	51	95	995	1,954	3,674	3,984	1,236	302	301	166	142	137	13,035
1936	137	145	154	157	7,376	1,063	1,152	262	248	194	111	94	11,093
1937	141	143	5,766	8,199	55,835	36,122	8,517	2,132	673	28	24	0	117,583
1938	40	42	686	1,093	5,248	106,714	5,357	2,688	512	30	0	0	122,408
1939	0	158	4,445	3,725	7,823	3,552	1,984	479	3	0	0	806	22,976
1940	299	444	640	7,031	9,552	1,928	2,143	343	0	0	0	0	22,380
1941	0	0	8,703	2,724	16,977	53,746	27,743	6,201	1,713	156	5	0	117,968
1942	819	1,313	3,013	3,524	2,533	3,021	2,058	630	84	0	0	0	16,995
1943	0	37	543	32,807	13,347	22,246	4,310	1,064	166	0	0	0	74,521
1944	0	0	3,291	1,753	14,306	6,450	1,461	469	151	0	0	0	27,880
1945	0	3,930	1,065	1,047	2,872	8,818	2,159	398	56	0	0	0	20,344
1946	0	0	4,052	1,104	1,043	2,594	2,730	155	0	35	0	0	11,713
1947	0	1,327	2,202	1,520	949	707	243	4	0	0	0	0	6,953
1948	0	0	0	0	203	176	185	0	0	0	0	0	564
1949	0	0	0	0	171	309	0	0	0	0	0	0	481
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	21,528	797	21,353	3,678	435	0	0	0	0	47,790
1953	0	0	0	0	7	2	0	0	0	0	0	0	9
1954	0	0	0	0	3,291	2,808	1,292	30	0	0	0	0	7,422
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	7,679	22,613	180	1	0	0	0	30,473
1959	0	0	0	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	2,490	2,390	0	716	93	24	9	0	0	0	0	5,722
1967	0	0	4,421	0	1,365	625	919	125	14	4	0	0	7,475
1968	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	21,747	80,165	11,357	3,013	705	91	31	22	18	117,149
1970	14	14	15	0	18	4,513	47	12	8	5	0	0	4,644
1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	3,051	3,390	424	57	25	4	0	0	6,951
1974	0	0	0	0	122	349	27	0	0	0	0	0	498
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	46,194	41,478	66,048	2,659	1,017	268	1	0	0	157,664
1979	0	0	1,670	14,931	14,374	10,561	6,358	1,749	722	193	0	0	50,558
1980	0	0	0	25,827	129,770	37,313	9,164	3,252	123	105	49	40	205,642
1981	742	716	1,618	1,351	1,622	3,114	1,274	839	193	0	0	0	11,470
1982	0	205	580	5,104	3,425	13,190	4,476	1,301	718	372	0	0	29,372
1983	138	2,929	3,762	6,177	12,030	49,179	12,032	5,494	1,777	598	1,947	252	96,314
1984	2,424	3,699	7,620	2,163	1,232	746	248	98	0	0	0	0	18,230
1985	0	0	3,962	1,479	2,263	1,445	864	393	0	0	0	0	10,405
1986	0	2,233	1,256	328	5,251	11,331	1,926	725	658	59	0	298	24,067
1987	402	1,017	1,075	1,538	1,017	237	255	116	6	0	0	0	5,664
1988	303	2,079	2,189	2,622	892	665	643	440	42	0	0	0	9,875
1989	0	89	1,033	662	461	373	288	258	174	0	0	0	3,337
1990	0	292	1	444	949	358	527	347	381	51	0	0	3,351
1991	0	86	352	293	949	30,807	2,380	768	435	246	134	170	36,619
1992	101	121	741	3,347	11,466	11,236	3,777	1,435	717	360	194	91	33,587
1993	365	175	2,787	139,505	72,193	15,220	7,035	4,290	1,843	566	502	310	244,791
1994	1,110	527	722	985	7,162	4,366	2,155	1,323	501	161	0	0	19,012
1995	0	73	549	42,570	19,954	55,268	8,125	3,884	1,883	595	279	213	133,394
1996	118	235	641	765	4,129	3,910	753	259	54	0	0	0	10,865
Median 1923-1926	**0**	**0**	**165**	**396**	**235**	**209**	**540**	**19**	**0**	**0**	**0**	**0**	
Median 1930-1996	**0**	**0**	**253**	**553**	**1,030**	**904**	**507**	**166**	**7**	**0**	**0**	**0**	
Median Period of Record	**0**	**0**	**165**	**444**	**1,017**	**707**	**527**	**149**	**6**	**0**	**0**	**0**	

San Mateo Creek

Gauge 11046300 "Upper Gage" (Acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Year Total
1947													
1948													
1949													
1950													
1951													
1952													
1953	0	78	347	530	177	223	151	73	16	0	0	0	1,595
1954	0	0	0	2,500	1,340	2,350	1,070	301	75	2	0	0	7,638
1955	0	2	23	631	234	282	81	95	8	0	0	0	1,356
1956	0	0	4	2,390	262	131	158	61	5	0	0	0	3,011
1957	0	0	0	95	120	251	98	65	8	0	0	0	637
1958	0	0	59	186	3,070	7,890	16,070	1,140	259	50	2	0	28,726
1959	0	11	19	79	825	136	61	23	1	0	0	0	1,155
1960	0	0	3	205	429	224	168	18	0	0	0	0	1,047
1961	0	0	0	6	5	2	0	0	0	0	0	0	13
1962	0	0	44	408	1,930	1,210	343	128	33	0	0	0	4,096
1963	0	0	0	0	321	96	57	20	5	0	0	0	499
1964	0	2	0	68	26	137	95	16	0	0	0	0	344
1965	0	0	0	1	6	13	1,060	20	0	0	0	0	1,100
1966	0	4,130	2,860	2,280	964	486	199	54	0	0	0	0	10,973
1967	0	0	10,100	2,060	1,100	680	1,440	909	331	94	0	0	16,714
1968	0	286	423	153	166	361	139	68	6	0	0	0	1,602
1969	0	0	5	9,483	31,415	7,799	2,326	1,088	592	231	80	74	53,093
1970	75	124	123	193	219	1,596	195	92	48	15	0	0	2,680
1971	0	45	754	378	179	111	78	58	25	0	0	0	1,628
1972	0	5	99	149	90	49	17	0	0	0	0	0	409
1973	0	16	70	592	2,248	3,381	723	167	23	0	0	0	7,220
1974	0	0	0	1,438	67	978	167	48	1	0	0	0	2,699
1975	0	0	14	10	117	828	1,144	216	58	0	0	0	2,387
1976	0	0	0	2	226	285	61	10	0	0	0	0	584
1977	0	0	0										0
1978													0
1979													0
1980													0
1981													0
1982													0
1983													0
1984													0
1985													0
1986													0
1987													0
1988													0
1989													0
1990				61	250	72	64	89	21				557
1991	0	0	0	0	81	3,916	161	6	0				4,164
1992	0	0	0	4	3,231	4,562	2,401	1,618	0				11,816
1993	0	0	1,052	32,226	19,642	6,300	2,051	833	358	129	62	46	62,699
1994	32	63	145	151	1,590	717	289	181	47	0	0	0	3,215
1995	0	4	17	8,080	5,530	22,810	3,670	1,580	772	295	79	38	42,875
1996	64	100	119	221	1,070	812	298	64	12	0	0	0	2,760
Median 1953-1976	**0**	**0**	**14**	**199**	**230**	**284**	**163**	**63**	**7**	**0**	**0**	**0**	
Median 1990-1996	**0**	**2**	**68**	**151**	**1,590**	**3,916**	**298**	**181**	**21**	**65**	**31**	**19**	

San Mateo Creek

Gauge 11046310 "Lower Gage" (Acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Year Total
1947	6	6	6	6	6	6	6	6	2	0	0	0	50
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	0	0	0	0	0	0	0	0	0	0	0	0
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	7,860	369	11,480	2,610	560	2	0	0	0	22,881
1953	0	113	366	449	52	42	9	0	0	0	0	0	1,031
1954	0	0	0	2,050	814	1,330	460	13	0	0	0	0	4,667
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	1,320	0	0	0	0	0	0	0	0	1,320
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	4	508	6,020	18,090	399	123	2	0	0	25,147
1959	0	0	8	2	402	19	12	14	13	12	10	15	508
1960	8	4	0	0	0	0	0	0	0	0	0	0	12
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	2,800	50	0	0	0	0	0	0	2,850
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	2,645	1,880	1,350	306	93	9	0	0	0	0	0	6,283
1967	0	0	12,540	2,420	1,040	529	1,960	705	184	72	0	0	19,451
1968	0	195	238	42	6	339	14	6	0	0	0	0	840
1969	0	0	0	14,837	45,797	13,487	3,019	1,153	395	94	51	37	78,870
1970	33	27	12	18	23	0	0	0	0	0	0	0	113
1971	42	38	494	95	36	51	56	38	64	76	74	61	1,125
1972	48	58	207	72	69	60	52	46	47	40	40	38	777
1973	40	36	36	232	1,499	2,747	362	87	70	76	72	59	5,316
1974	54	54	53	547	70	319	88	78	57	61	53	46	1,480
1975	51	50	95	50	53	665	1,108	88	78	70	62	55	2,425
1976	28	27	28	30	42	44	38	33	31	31	26	22	380
1977													
1978													
1979													
1980													
1981													
1982													
1983													
1984													
1985													
1986													
1987													
1988													
1989													
1990													
1991													
1992													
1993													
1994													
1995													
1996													
Median 1947-1976	0	0	0	12	30	31	7	0	0	0	0	0	
Median 1953-1976	0	0	4	36	47	47	11	3	0	0	0	0	

Appendix F.

Macroinvertebrate Data and Map of Sampling Sites.

Appendix F. Summary of macroinvertebrate taxa collected during the spring of 1997.

		Santa Margarita River						Roblar Cree	San Onofre Cree		San Mateo Creek				
		2	3	4	5	6	7	1	1	2	1	2	3	4	6
	Feeding	98	9	10	52	253	369	429	3006	267	2788	2610	542	281	143
DIPTERA	Guild														
Tipulidae	SH	33	1	2	3	6		25	7	3	124	89	1		
Simuliidae	F	19	4	1	16	20	33	24	117	26	586	175	26		
Psychodidae	CG											38			
Chironomidae		8			3	29	73	62	358	139	754	312	23	10	8
Chironamidae	CG				1	12	7	24		55	392	104	9	2	3
All others	CG	8			2	17	66	38	358	84	362	208	14	8	5
Ceratopogonidae	P							5	50						
Stratiomyidae	CG				2	2				1	1		7	2	
Syrphidae	CG							1		1					
Ephydridae	CG							33	85	5	30		11	4	
Muscidae	P		1	1		1	2								1
Ephemeroptera															
Baetidae	SC	13	2	4	19	119	163	138	1630	13	891	1241	166	131	58
Caenidae	SC	4	1			45	35	19	144		266	635	69	30	9
Leptophlebiidae	SH								83					1	
Siphlonuridae	C	1										8		1	
Odonata															
Coenagrionidae	P						2	11		3	7			5	5
Calopterygidae	P					5	1	3							
Libellulidae	P						2		2		3				
Aeshnidae	P							3	3	6	1				
Gomphidae	P				4	2	4	7	4	3	1		1	3	2
Plecoptera															
Amphinemuridae	SH				1							3	34	2	3
Perlodidae	P							5				4	24	14	4
Nemouridae	SH							21				1	30		
Tricoptera															
Hydropsychidae	F	12				7	10	33			1	1	41	22	8
Hydroptilidae	CG	2					5	5					26	23	7
Philopotamidae	F					3	4							14	3
Polycentropoidae	P						1						3		
Psychomyiidae	SC					1	3								
Rhyacophilidae	P	4				4		3							
Philimyiidae	F	1													
Brachycentridae	0														
Lepidostomtidae	SH					2							43		
Lepidoptera															
Pyralidae	SC						23								
Megaloptera															
Corydalidae	P				1			3		2	3	11	4	2	
Coleoptera															
Dryopidae							1	14	35	22	26	9	5		4
larvae	SH							6	27	15	26	8			
adults	SC						1	8	8	7		1	5		4
Elmidae	CG					1	2	3	338	10	30	2		1	1
Gyrinidae	P								23		17	2	5		
Psephenidae	SC						3		15			3			
Dytiscidae	P						2	9	26	10	43	12	15	14	17
Haliplidae	SC								15	22		34		2	9
Hydrophilidae									69		4	30	6		1
larvae	P								35						
adults	CG								34		4	30	6		1
Hemiptera															
Gerridae	P												2		1
Belostomadidae	P					5		1	2	1					1
Salidae	P			2											
Corixidae	P	1				1		1							1
Naucoridae	P				3										

SMR-1

Water Quality - Field Data Collection Sheet

Date 3/17/97 Time 4:45 pm Weather Clear Page 1 of 2

Collector(s) Bruno, Mike C, Rabbick Air/Temp. 70°F

Stream SMR1 (Mouth) Reach DS of I-5 Bridge

SITE	TEMP.	AVE DEPTH	Ph	TIME	ppm D.O.	mg/l NO_3	mg/l NH4	PO4	cs/cm COND.	g/l TDS	ppt SALINITY
A.	18°C	6" ft/m		1420	9.5	0.03	NG		210 X 10	0.29	15
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

TDS = Total dissolved solids

Comments

A. ↓ Highway 5 100 yds. 5:00 pm (1700)

B. NH_4 negligible

C. pH could not get to stabilize using DR/700

D.

Lat.

Long.

Map drawing marked on airphoto YES / NO

Insects Collected YES / (NO)

GPS Reading (YES) / NO

GPS @ Beach USGS BM 26

Map/ additional comments

Mouth is open
Water Level is Low - tide is out
Mullet seen in shallows

F-2

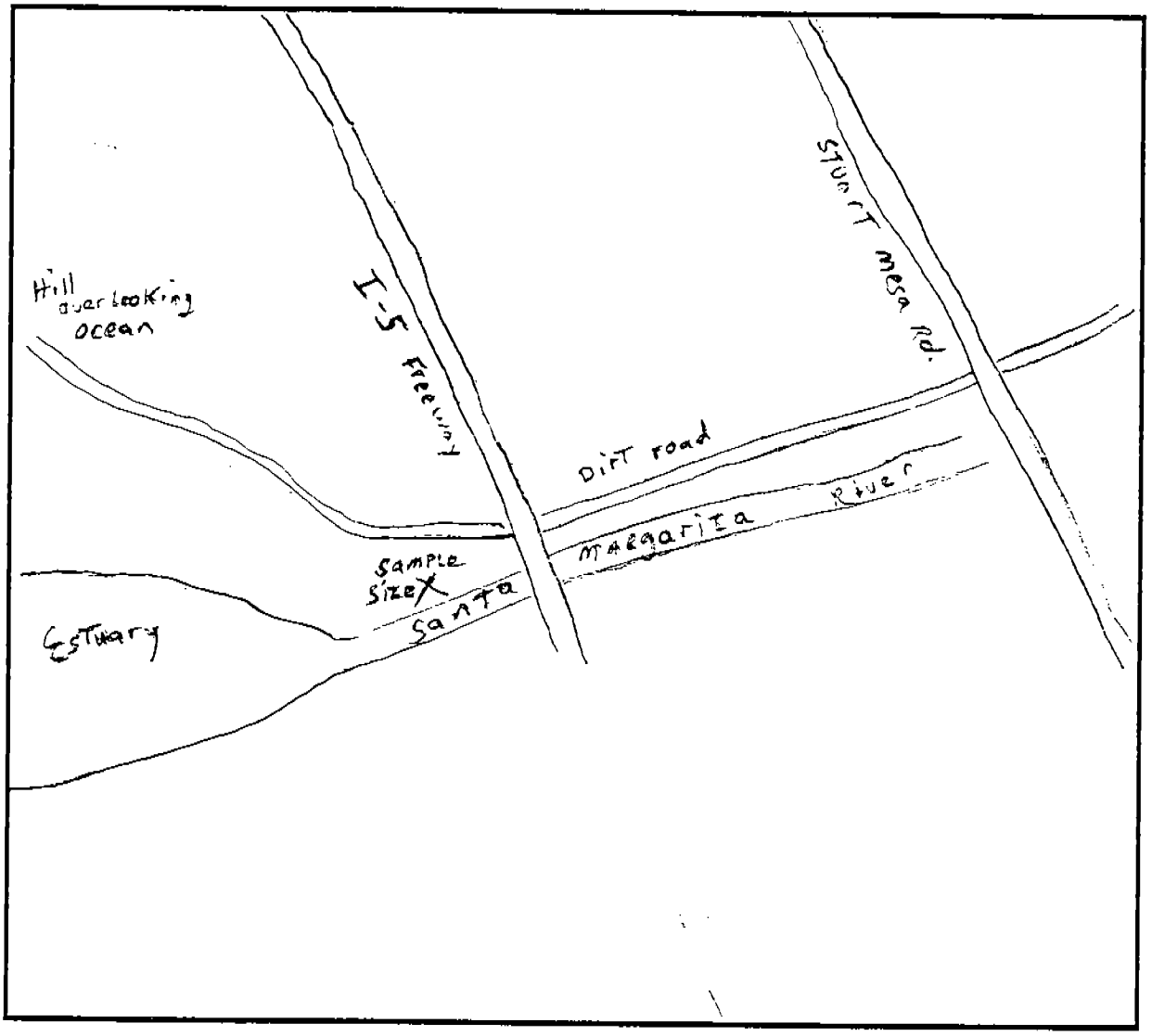
Hand Map of Stream location

Date 3-17-97

Author of Map MC

2/2

Field Crew MC, BO, RK



SMR 1

Going North on Stuart Mesa Rd. Take first dirt road to left after crossing the Santa Margarita River. The sampling location (water quality only) was 100 yards downstream of the I-5 bridge

~~SMR~~

SMR-2

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 8:45

Collector(s) RK MC

Stream South Margarita River

Weather Clear Sunny

Air/Temp. ≈ 70°F

Reach SMR-2

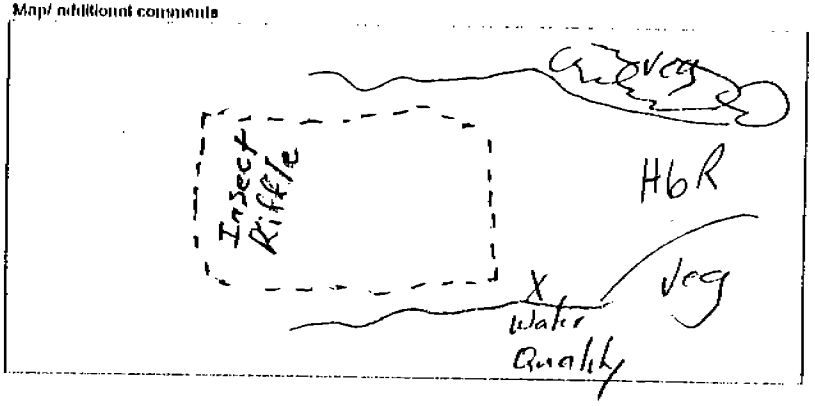
TDS = Total dissolved solid

SITE	TEMP.	DEPTH	PH	TIME	ppm D.O.	mg/l NO_3	mg/l NH4	PO4	cs/cm COND.	g/l TDS	% SALINITY
A.	14°C	1.50 m	7.3	8:45	10.6	2.1	0.3	X	1.31 X10	.65	
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments

A. Sample location is a recently (this year) formed side channel. The old main flow channel had standing water pools that were 3"-4" in depth. The bank Right Side of our sample location was heavily vegetated. Steward mesa to mac to dirt road was route followed

Map/ additional comments



utm/lat/long

Lat: 0463436e

Long. 3677809n

Map drawing marked on airphoto (YES) / NO

Insects Collected (YES) / NO

GPS Reading (YES) / NO

N 33° 14.319

W 117° 23.575

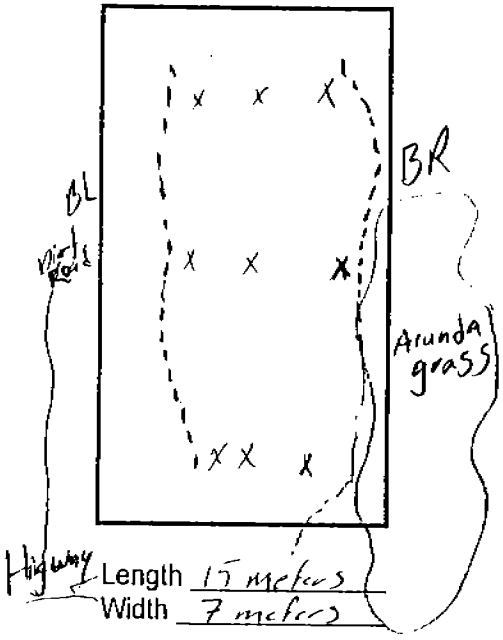
Elevation 221'

SMR-2

Riffle Sample Locations

INSECT COLLECTION DATA FORM

Page 2 of 4



Length 15 meters
Width 7 meters

Date/Time 3/20/97 900
Collector(s) RK, ML
Stream Santa Margarita River
Sample Number SMR2 1, 2, 3
County Sandiego
Township N33 14.319 Range W 117° 23.575
Elevation 221'

Weather Sunny slight breeze out of the east
Air/ Temp. ≈ 70°
Reach SMR2
Depth 0.05'

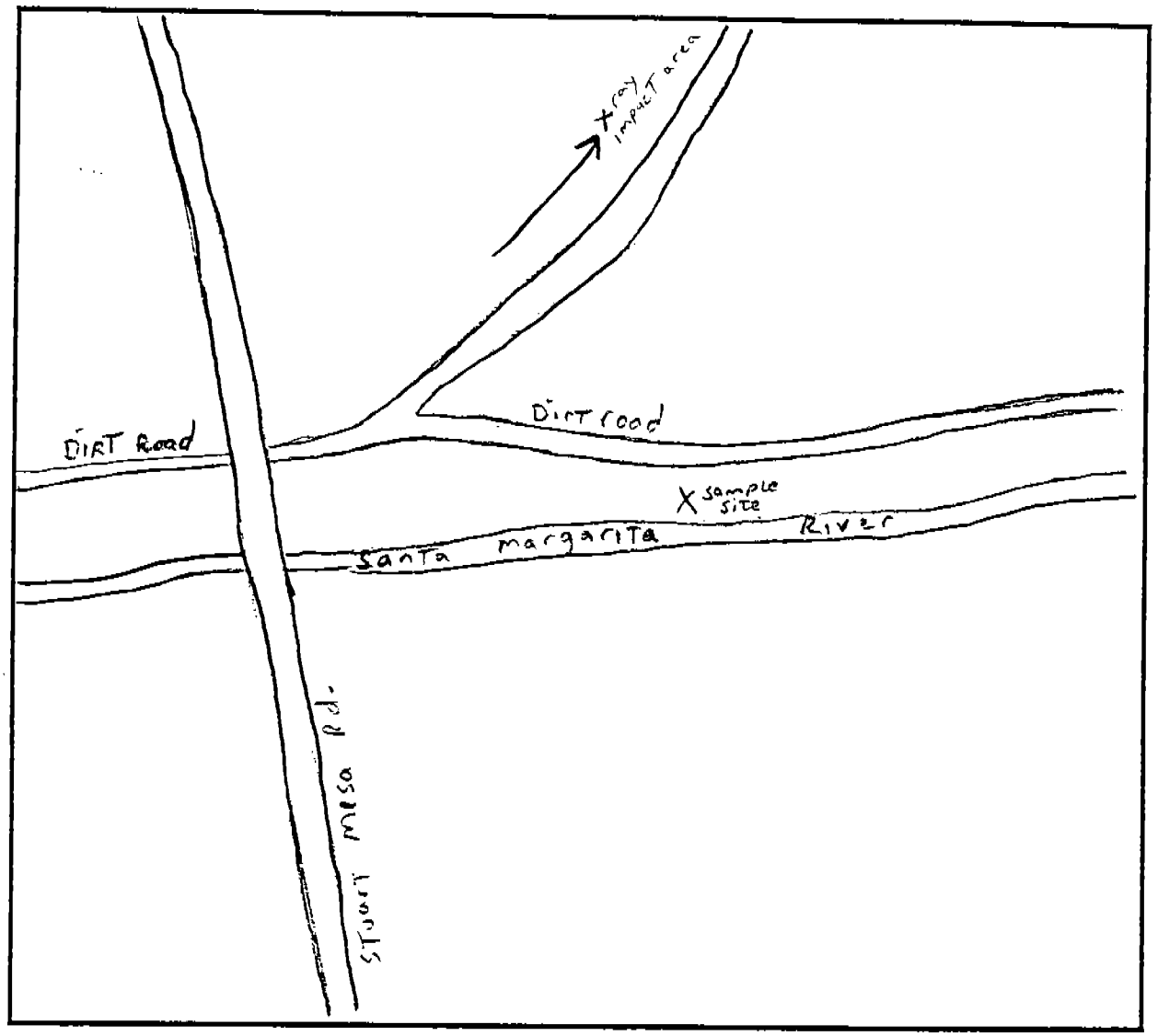
Comments

Above a nice pool 4'-5' deep. 1/2 to 1/4 mile upstream from the highway. 50 meters of the dirt Road we came in on.

Hand Map of Stream location Date 3-20-97 3/4

Author of Map MC

Field Crew MC, BO, RK



SMR2

Going North on Stuart Mesa Rd. turn right on dirt road after crossing The Santa Margarita River. When the road forks stay to the right and follow the dirt road along the river. The water quality and insect sample site was a 1/4 mi upstream of Stuart Mesa Rd.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: Santa Margarita River

Location: SMR-2

Date: 6-25-97 Page 4 of 4

Order: Family Genus Species	Sample site Tallies 2.1	2.2	2.3
Diptera			
Tipulidae	23	8	2
Simuliidae	4	9	6
Chizonomidae	3	2	2
All others	2	6	Ø
Ephemeroptera			
Baetidae	3	3	7
Caenidae	2	1	1
Siphlonuridae	1	Ø	Ø
Tricoptera			
Hydropsychidae	12	Ø	Ø
Hydroptilidae	Ø	2	Ø
Rhyacophilidae	4	Ø	Ø
Philimyiidae	Ø	Ø	1
Hemiptera			
Corixidae	Ø	1	Ø
	54	32	19

SMR - 3

Water Quality - Field Data Collection Sheet

Date 3/27/97 Time 830 Weather OVERCAST Page 1 of 4

Collector(s) RK, MC Air/Temp. ≈60°F

Stream Santa margarita below airstrip Reach SMR3

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO_3 (mg/l)	NH4 (m/l)	PO4	COND. (cs/cm)	TDS (g/l)	SALINITY (‰)
A. SMR3	18°C	.4 ft/m	7.0	8:35	9.0	1.6	NE6		1.47	0.74	1K 1P
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

1 TDS = Total dissolved solid

Comments

A. Clear water, no cobble rock substrat present. Sand as far as the
B. eye can see. This location is adjacent & down stream a sewage treatment
C. Facility and related oxidation ponds. Rip-Rap lines the banks reinforced with 3"x3"
D. Chicken wire boxes filled with cobble

Latt. N 33° 17' 03.43

Long. W 117° 22' 26.73

Map drawing marked on airphoto (YES) / NO

Insects Collected (YES) / NO

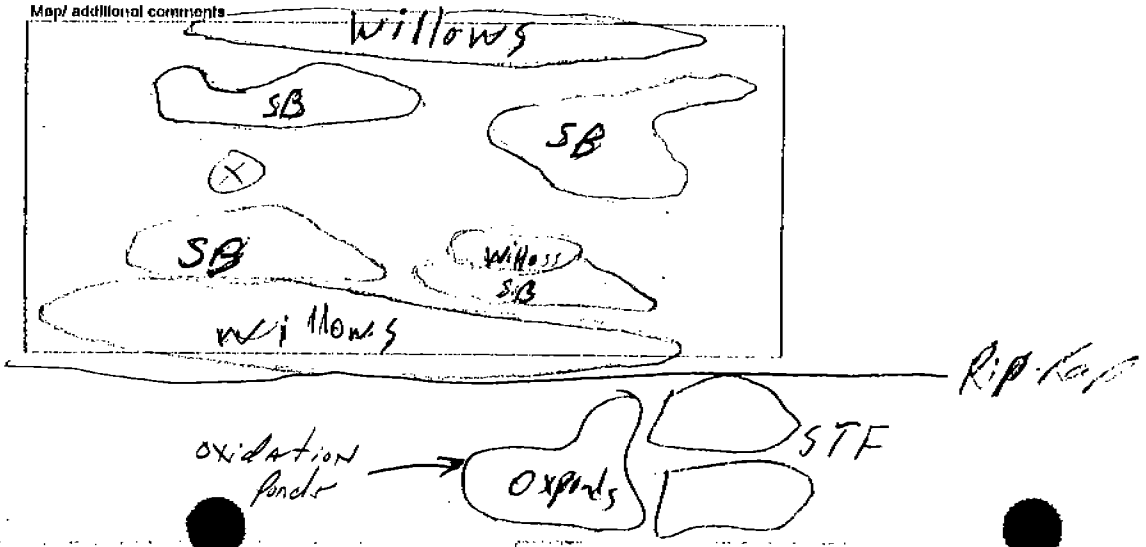
GPS Reading (YES) / NO

0465173e

3682866n

elevation 22 feet

Map/ additional comments

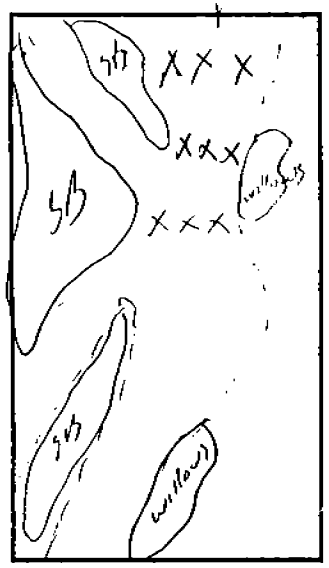


SMR-3

Riffle Sample Locations

INSECT COLLECTION DATA FORM

Page 2 4



Length 10 meters
Width 4 meters

Date/Time 3/27/97

Collector(s) RWK, MC

Stream Santa Margarita Below air strip

Sample Number SMC 3 1, 2, 3

County Sandiego

Township N 33° 17' 03.43 Range W 117° 22' 26.73

0465173 e
3682866 n
22'

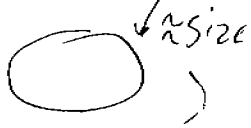
Weather Overcast

Air/ Temp. 2-60

Reach SMR-3

Comments

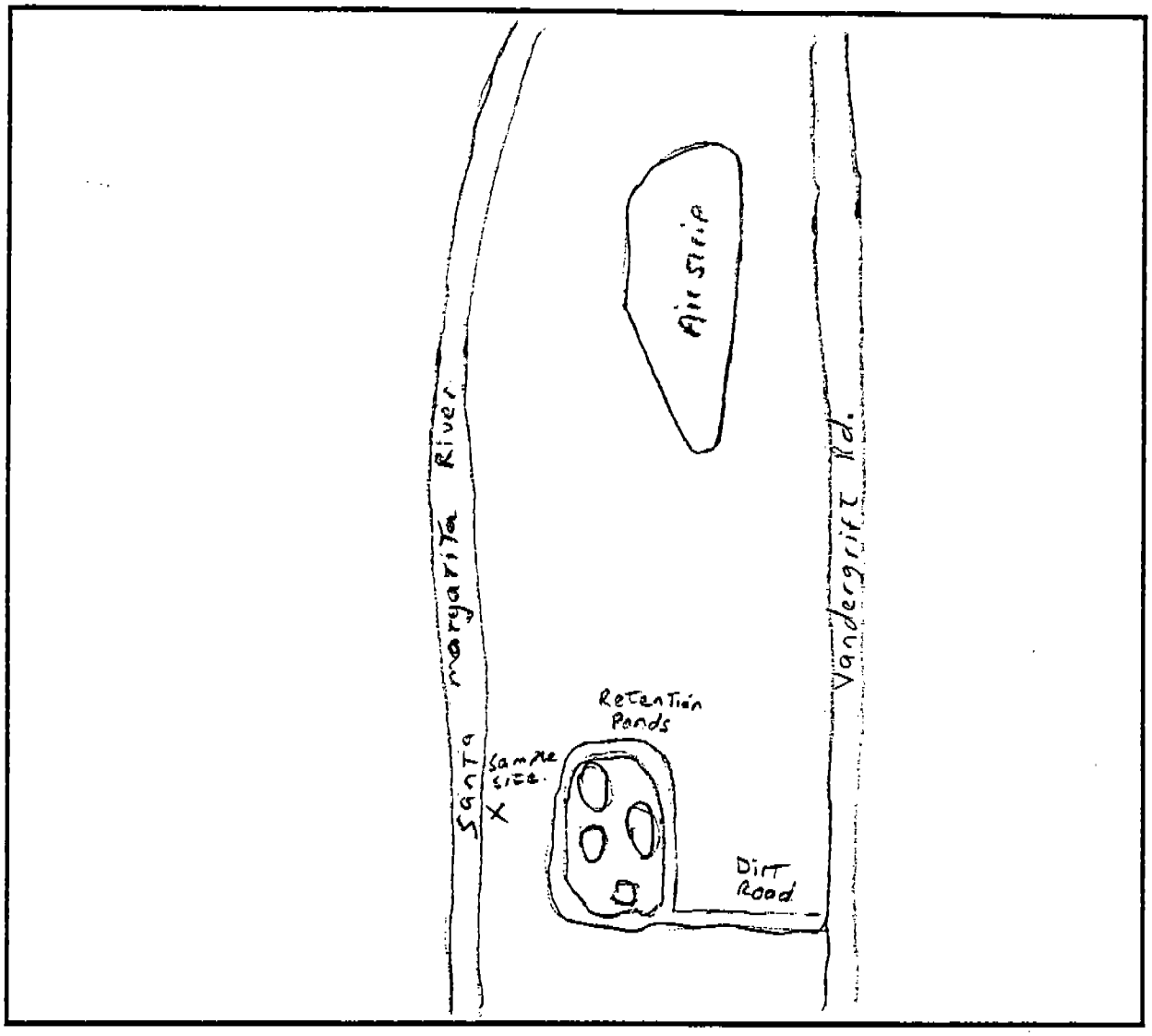
This location is typical of SMR. Wide shallow and not many invertebrates are hearty enough to endure living here. I just spent 3 min watching the epibenthic organisms (mostly dylished beetles and aquatic mites) scoot over the sand. They are fast darters most of them crawling rapidly over the top. A few of the others are living on submerged macrophytes. I saw a giant water bug along the wetted edge in the plant material



Hand Map of Stream location Date 3-27-93 3/4

Author of Map MC

Field Crew MC, BO, LA



SMR3

Going south on Vandergrift Rd. Turn right onto first dirt road just past the airstrip. The dirt road circles around some water retention ponds. Water quality and insect samples were taken accross from ponds.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: Santa Margarita River

Date:

Location: SMR -3

Sample site Tallies

Order: Family Genus Species	3.1	3.2	3.3
Diptera			
Tipulidae	Ø	1	Ø
Simuliidae	3	1	Ø
Muscidae	1	Ø	Ø
Ephemeroptera			
Baetidae	2	Ø	Ø
Caenidae	Ø	Ø	1
	6	2	1

SMR-4

Water Quality - Field Data Collection Sheet

Date 3/19/97 Time 11:30

Collector(s) RVK JO MJC

Stream Santa Margarita

Weather 80° Nice Day Clear

Page 1 of 4

Air/Temp. 80°

Reach SMR-4, Below Diversion Dam

SITE	TEMP.	DEPTH (10" = 1.0)	Ph	TIME	D.O. (ppm)	NO_3 (mg/l)	NH4 (mg/l)	PO4	COND. (c/cm)	TDS (g/l)	SALINITY (o/oo)
A.	27.0°C	0 m	7.6	11:30	11.5	2.3	<.1		110x10	0.61	.001
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

TDS = Total dissolved solids

Comments

A. O_2 was in a riffle, pH meter was fluctuating a lot

B.

C.

D.

Lat.

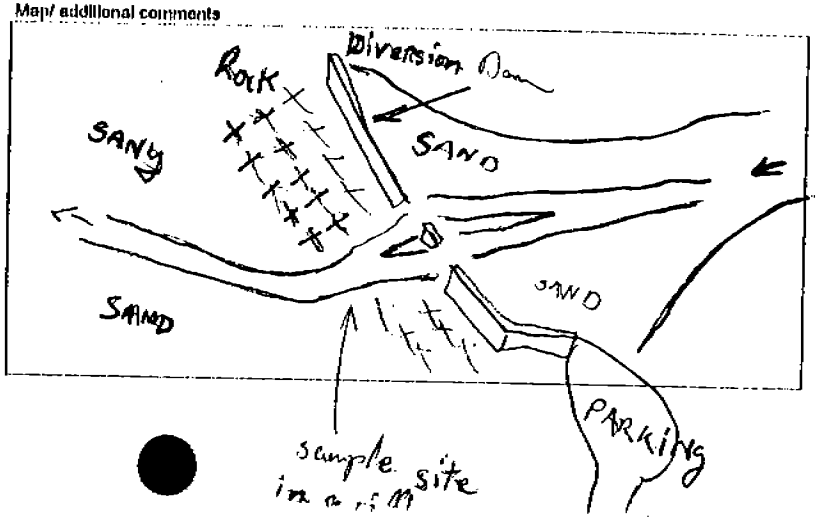
Long.

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

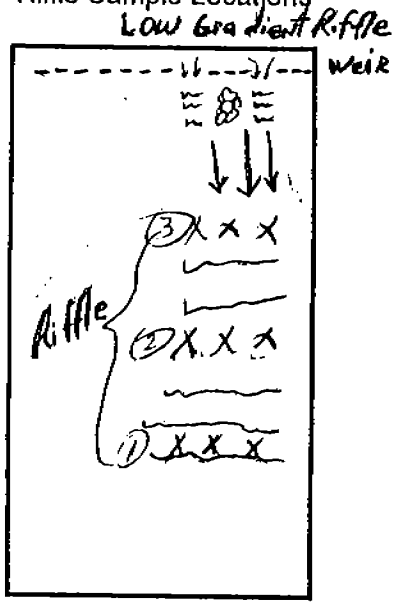
GPS Reading YES / NO

Map/ additional comments



SMR-4

Riffle Sample Locations



Length 39 meters
Width 7.1 METERS

INSECT COLLECTION DATA FORM

Date/Time 3/19/97 1145 - 1258

Weather clear & hot no clouds

Collector(s) RNK, BO, M

Air/ Temp. 80°F

Stream Santa Margarita below weir

Reach SMR 4 below weir

Sample Number SMR4

County Sandiego

Township _____ Range _____

33° 20.463 N
117° 19.880 W

SAND! Dominant substrate making sampling a problem!

Comments

One transect took 20 min to Sort we Found Several dipteran larvae & one possible chironomid. Sand was 3"-5" deep in our Kicknet after 2 min

Photos taken, & video of diversion dam.

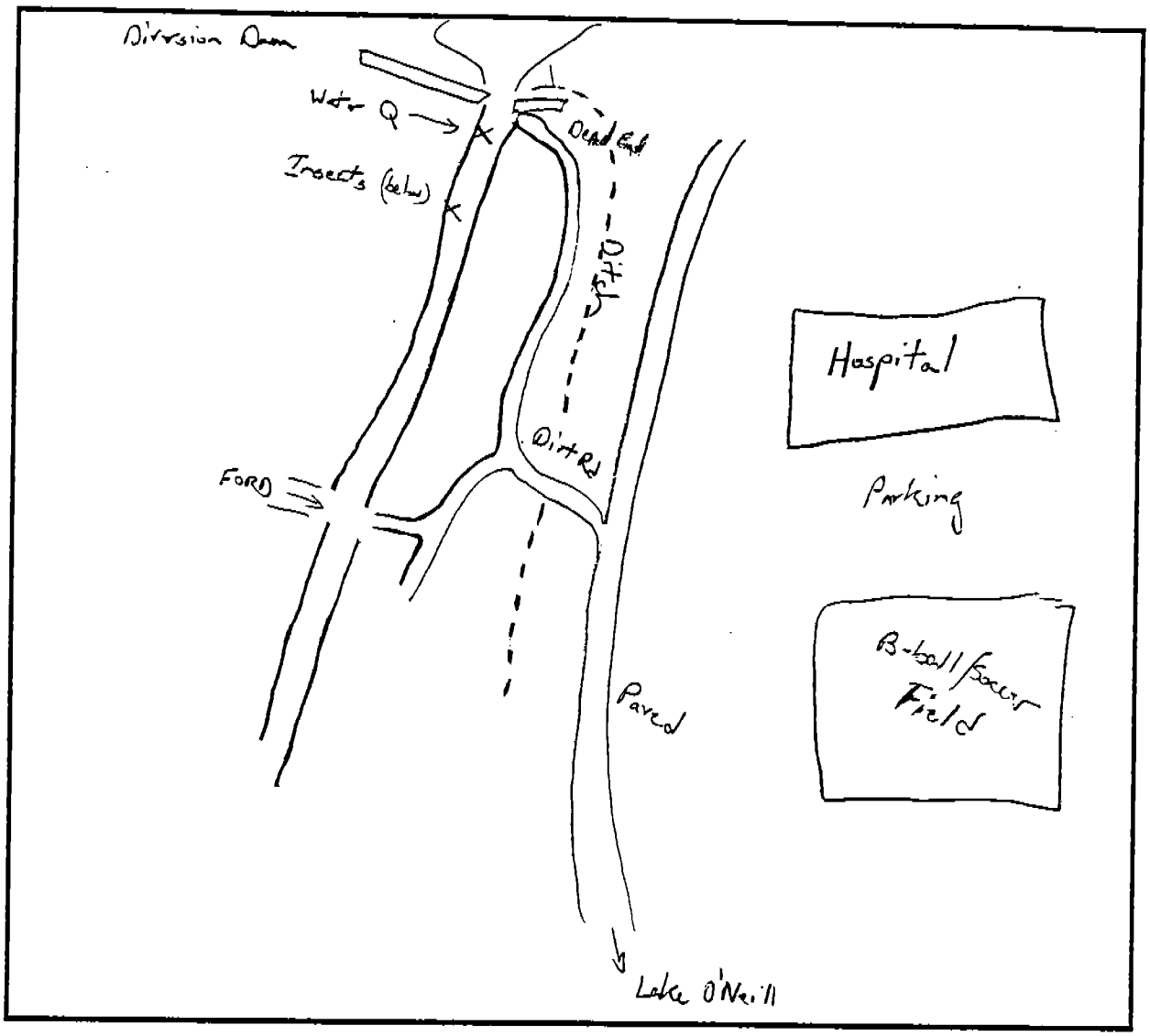
We Sampled Bank left Side Channel

Hand Map of Stream location

Date 3-19-97 3/4

Author of Map MC

Field Crew MC, BO, RK



SMR4 Dirt road access from hospital

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Date:

Location: SMR - 4

Order:	Family	Genus	Species	Sample site Tallies 4.1	4.2	4.3
Diptera						
	Tipulidae			Ø	2	Ø
	Simuliidae			Ø	1	Ø
	Muscidae			1	Ø	Ø
Ephemeroptera						
	Baetidae			3	Ø	1
Coleoptera						
	Dryopidae			Ø	Ø	2
Hemiptera						
	Salidae			1	1	Ø
				5	4	3

SMR-5

Water Quality - Field Data Collection Sheet

Date 3/17/97 Time 1400

Collector(s) RNK, AO MC

Stream Santa Margarita River

Weather No clouds, Hot & Sunny

Air/Temp. ?

Reach SMR-5

Page 1 of 4

SITE	TEMP.	DEPTH (AVG.)	Ph	TIME	D.O. (ppm)	NO_3 (mg/L)	NH_4 (mg/L)	PO4	COND. (cs/cm)	TDS (g/L)	SALINITY (%)
A. SMR-5	28°C	0.20 m	7.8	1400	8.2	0.08	<0.01	X	1.35	.68	<1
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

TDS = Total dissolved solids

Comments

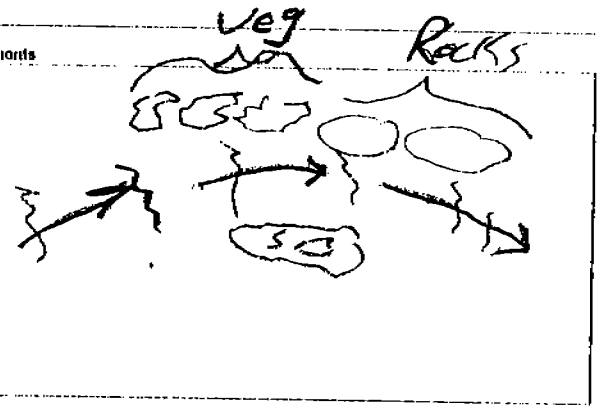
A. ↑ 75 yards of O'Neil Homes Rd Xing

B.

C.

D.

Map/ additional comments



Lat.

Long.

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

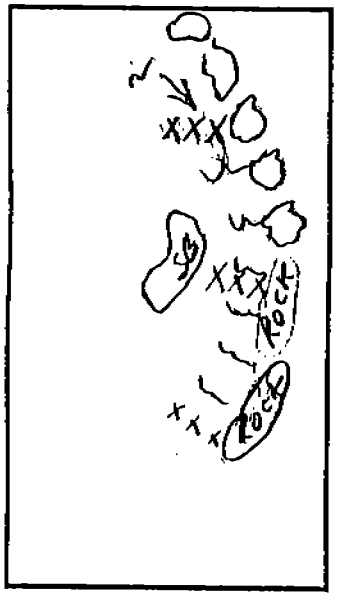
040087e 3691447n

33° 21.711 N 117° 19.291 W

elevation 203 ft

SmR-5

Riffle Sample Locations



Length 18 m
Width 7 m

INSECT COLLECTION DATA FORM

Date/Time 3/19/97

Collector(s) RNK, BO, MC

Stream Santa Margarita River

Sample Number SMR 5

County Sandiego

Township _____ Range _____

040087 e 33°21.711' N
3691447 n 117° 19.291' W
Elevation +00203 ft ±8.9m

Weather Nice Sunny

Air/ Temp. 80's

Reach SMR5 above weir site where there was a fire burning on adjacent hill

Comments

↑ 75 yards of Daniel Homes Rd. Xing
2nd Sample showed larger Organisms Really Shallow ≈ 0.07"
3rd Sample showed many Dipterans & lots of the small stuff

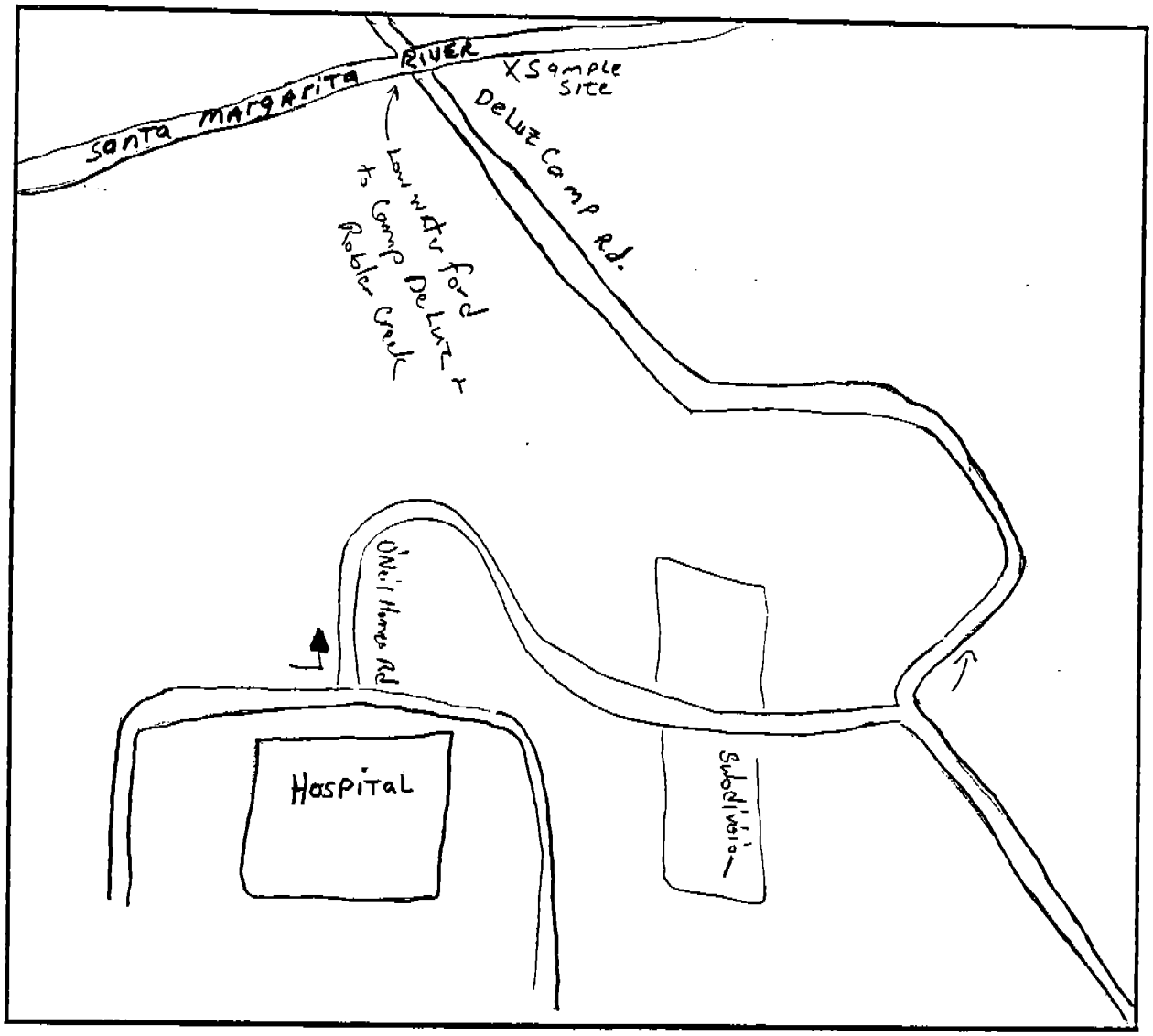
Hand Map of Stream location

Date 3-19-97

Author of Map MC

3/4

Field Crew MC, BO, RK



SMR5

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Date:

Location: SMR-5

Order: Family Genus Species	Sample site Tallies 5.1	5.2	5.3
DIPTERA			
TIPULIDAE	Ø	1	2
SIMULIIDAE	1	Ø	15
CHIRONAMIDAE	Ø	Ø	1
CHIRONAMIDAE (ALL OTHERS)	Ø	Ø	2
STRATIOMYIDAE	Ø	Ø	2
EPHEMEROPTERA			
BAETIDAE	3	3	13
ODONATA			
GOMPHIDAE	Ø	4	Ø
PLECOPTERA			
AMPHINEMURIDAE			
MALENKA SP.	Ø	Ø	1
MEGALOPTERA			
CORYDALIDAE			
NEOHERMES CALIFORNICUS	Ø	Ø	1
HEMIPTERA			
NAUCORIDAE	Ø	1	2
	4	9	39

SMR-6

Water Quality - Field Data Collection Sheet

Date 3/26/97 Time 10:10 Weather Sunny - warm Page 1 of 4

Collector(s) RNK, MI, BO Gail Bustillos, Paul Berret Air/Temp. ~~[illegible]~~ 26°C

Stream Santa Margarita River Reach Fallbrook SMR-6 Below DeLuz Rd. Bridge

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO_3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	TDS (g/l)	SALINITY (‰)
A. SMC6	19°C	3 m	7.2	10:30	7.4	2.1	0.02	X	1.5	.75	0.05
~~B.~~		ft./m									
~~C.~~		ft./m									
~~D.~~		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments (10m x 3m wide)

A.

~~B.~~

~~C.~~

~~D.~~

UTM 11S 0475621E
3695371N

Lat. W 33° 23' 50.55"

Long. W 117° 15' 43.72"

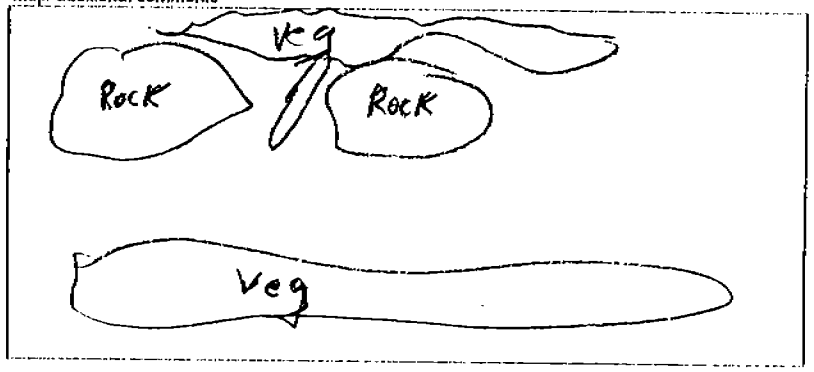
Map drawing marked on airphoto (YES) NO

Insects Collected (YES) / NO

GPS Reading (YES) / NO

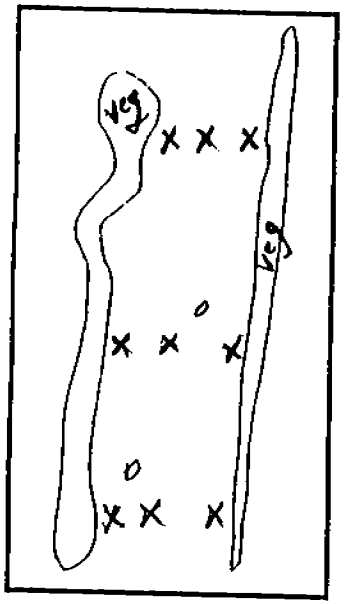
212 ft elev.

Map/ additional comments



SMR - 6

Riffle Sample Locations



Length 16 meters
Width 7 meters

INSECT COLLECTION DATA FORM

Date/Time 3/26/97 10:10 am

Weather Clear High clouds

Collector(s) RWK, BO, MC

Air/ Temp. ~70°F

Stream Santa Margarita Below bridge above Temp/marker location

Reach SMR 6

Sample Number SMR 6 1, 2, 3

County Sandiego

Township N 33° 23' 50.55 Range W 117° 15' 43.72

Comments

Nice area. Lots of algal material on stream bottom. Sorting in the field took a lot of time @ this location.

Seined for fish w/small 10' hand seine, found mosquito fish & arroyo chub present

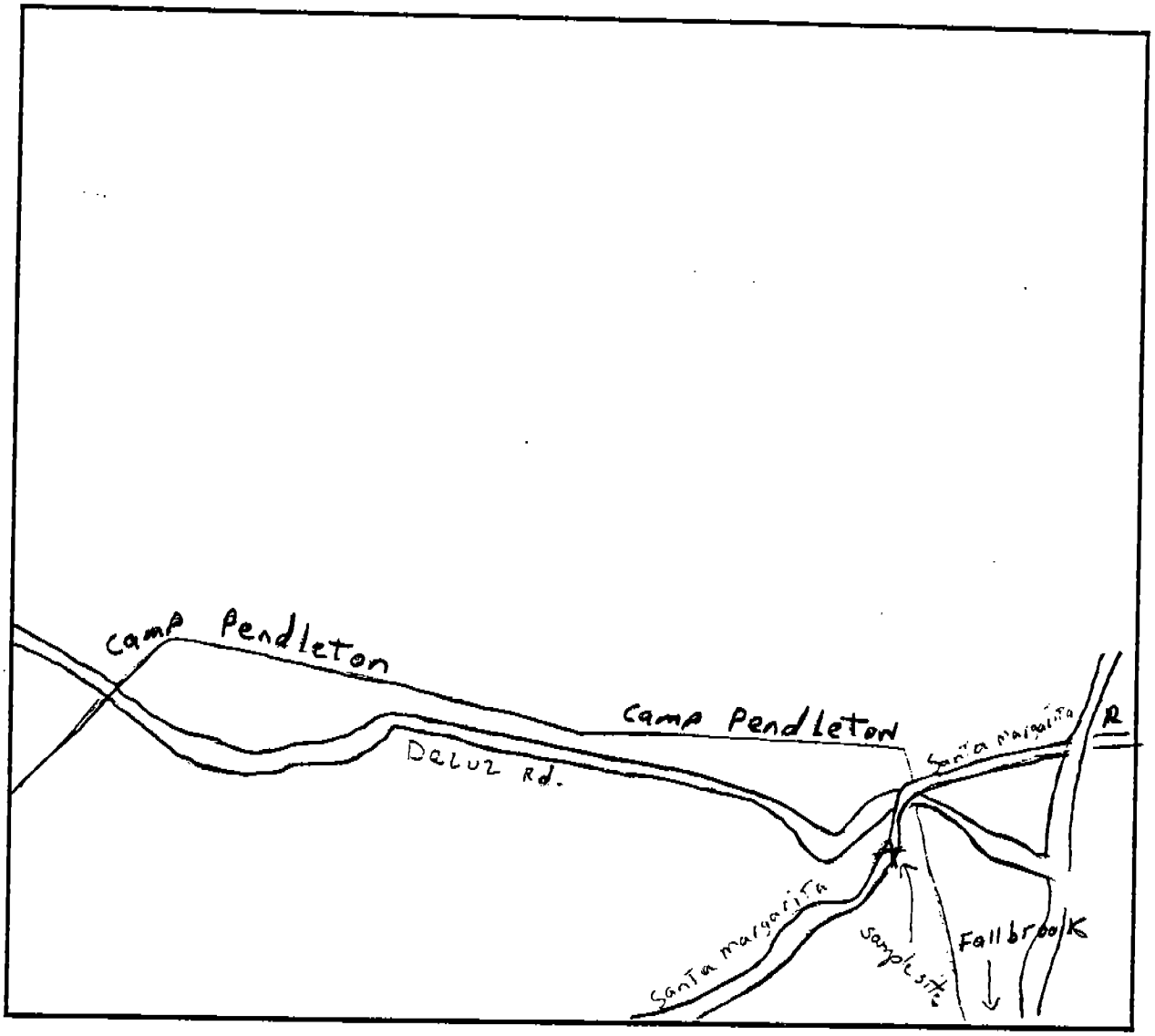
Hand Map of Stream location

Date 3-26-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SMR6

DeLuz Rd. Sampled DS of Bridge ≈ 300 yds

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Location: SMR-6

Date:

Order: Family Genus Species	Sample site Tallies 6.1	6.2	6.3
DIPTERA			
Tipulidae		6	
Simuliidae	2	10	8
Chironamidae	Ø	4	8
Chironamidae (All others)	Ø	3	14
Stratiomyidae	Ø	2	Ø
Muscidae	Ø	1	Ø
EPHEMEROPTERA			
Baetidae	45	46	28
Caenidae	15	18	12
ODONATA			
Calopterygidae	3	1	1
Gomphidae	Ø	1	1
TRICOPTERA			
Hydropsychidae	4	1	2
Philopotamidae	2	Ø	1
Psychomyiidae	Ø	Ø	1
Rhyacophilidae	1	1	2
Lepidostomtidae	Ø	Ø	2
Coleoptera			
Dryopidae	1	Ø	Ø
Elmidae	1	Ø	Ø
Hemiptera			
Belostomadidae	3	2	Ø
Corixidae	Ø	1	Ø
	77	97	80

SMR-7

Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 1710 Weather Clear no clouds Page 1 of 4

Collector(s) RK, MC Air/Temp. ≈ 70°

Stream Santa Margarita River Reach SMR 7 willow Glen Road

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	TDS (g/l)	SALINITY (%)
A SMR7	22.5°	1.0 (ft) m	7.4	1725	8.0	1.3	.01		1.41	.71	1X10
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments

A. This site is close to the access road, And makes a nice location for the
B. local kids to go swimming. We samplied inverts above the swimming hole.
C.
D.

Lat. N 33° 25.047

Long. W 117° 12.529

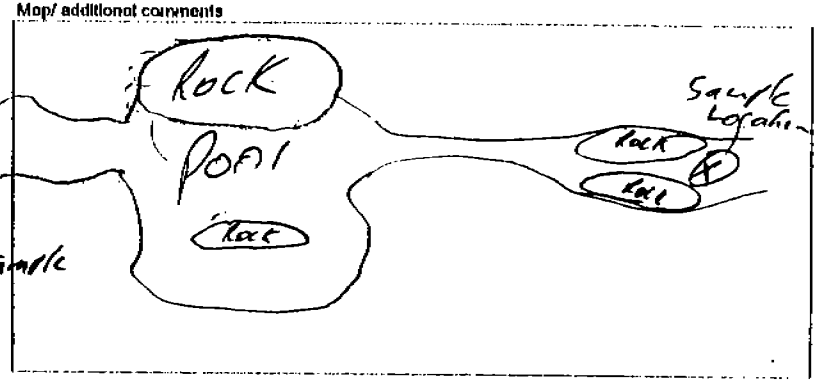
Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

115 0480578 E
3697583 S
Elevation 1100

Map/ additional comments

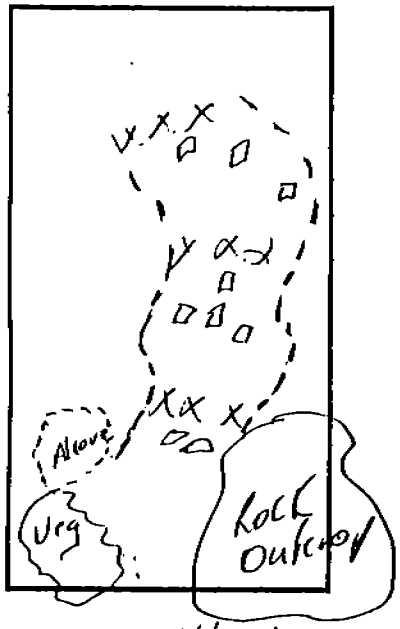


SMR-7

Riffle Sample Locations

INSECT COLLECTION DATA FORM

SMR - 7



Length 14 meters
Width 6 meters

Date/Time 3/25/97
Collector(s) RK, MC
Stream Santa Margarita River
Sample Number SMR7.1, 2, 3
County Riverside
Township N 33° 25.047' Range W 117° 12.527
Elevation 1109'

Weather Clear Coolingdown
Air/ Temp. ≈ low 70's
Reach SMR 7

WILLOW GLEN ROAD

115 0480578e
3697583 S
Elevation 1,1100'

Photo taken by MC

Comments

The water here is 1' to 1'3" deep and cobble is 1.5"-2' size class. Many of the rocks are covered with algal material which forms dense mats over most of the benthic area. Cattails & other freadophytes are dense along the wetted edges, Salix willows & Canyon live oak are dense along the flood plain. Scour pools & plunge pools form majority of instream hab types. I hear a bullfrog 100 yrds downstream bank right.

I think this is how SMR River should look from a riparian community standpoint. Sand bars are held in place by several year classes of Salix

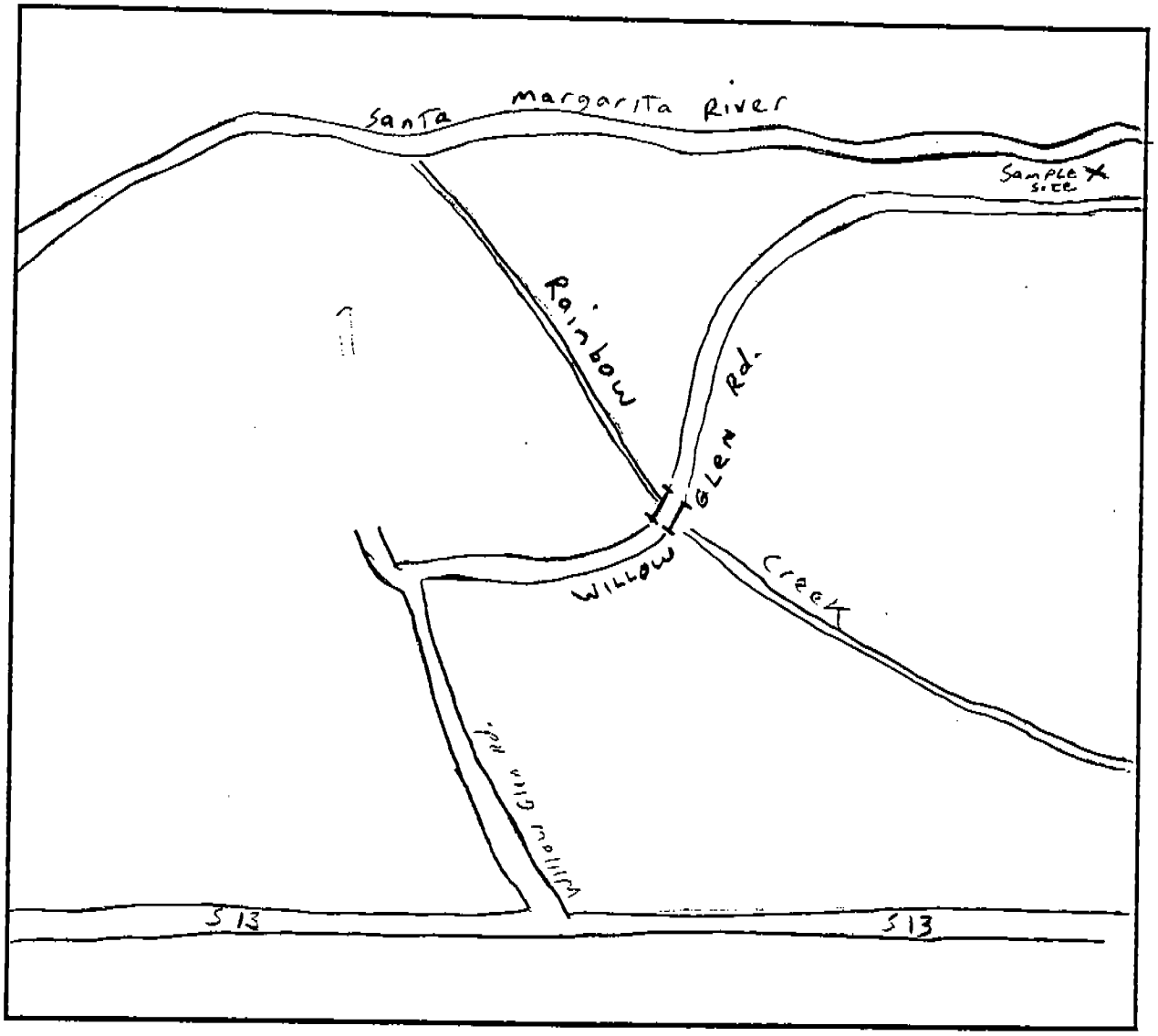
Hand Map of Stream location

Date 3-25-97

3/4

Author of Map MC

Field Crew MC, RK



SMR-7

Going North on I-15 Take exit at Monserate mtn. then turn west on S-13. Willow Glen is a right Turn off of S-13. The Road will split. Willow glen is to the right. The water quality and Insect Sample size was ¼ To ½ mile from where the Santa Margarita River starts to parallel Willow Glen Rd.

Replace

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Date:

Page 4 of 4

Location: SMR - 7

Order: Family Genus Species	Sample site Tallies 7.1	7.2	7.3
DIPTERA			
SimuliidAE	11	14	8
ChironamidAE			
ChironamidAE	4	2	1
(All others)	6	14	46
MuscidAE	Ø	1	1
EPHEMEROPTERA			
BAEtidAE	Ø	61	102
CAEnidAE	Ø	11	24
ODONATA			
COENAgrionidAE	Ø	2	Ø
CAlopterygidAE	Ø	Ø	1
LibellulidAE	Ø	2	Ø
GomphidAE	2	2	Ø
TRICOPTERA			
HydropsychidAE	2	1	7
HydroptilidAE	3	2	Ø
PhilopotAmidAE	2	2	Ø
PolycentropoidAE	Ø	1	Ø
PsychomyiidAE	Ø	2	1
LEPIDOPTERA			
PyRALidAE			
Petrophila sp.	2	4	17
COLEOPTERA			
DryopidAE (Adults)	1	Ø	Ø
ElmidAE	1	Ø	1
PsephenidAE			
Psephenus sp.	2	1	Ø
DytiscidAE	1	Ø	1
	35	122	210

SMR - 8

Water Quality - Field Data Collection Sheet

Date 3-25-97 Time _____ Weather _____ Page 1 of 1

Collector(s) _____ Air/Temp. _____

Stream _____ Reach _____

SITE	TEMP.	DEPTH	Ph	TIME	D.O.	NO2	NH4	PO4	COND.	S. SOLIDS	SALINITY
A.		ft./m									
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments

A. Could not locate site, NO DATA Collected

B.

C.

D.

Lat.

Long.

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

Map/ additional comments

Could not locate site

SMR - 9

Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 15.20 Weather cool high cloud wind from west Page 1 of 3

Collector(s) RK, ML Air/Temp. 70°F

Stream Murrieta Creek / South Margarita River Reach SMR ~~9~~ 8

SITE	TEMP.	DEPTH	Ph	TIME	ppm D.O.	mg/l NO_3	mg/l NH4	PO4	cs/cm COND.	g/l TDS	SALINITY
A SMR ~~9~~	22°C	20 ft/m	8.3	1515	7.8	3.6	.6		1.9	.95	1
~~B~~		ft/m									
~~C~~		ft/m									
~~D~~		ft/m									
		ft/m									
		ft/m									
		ft/m									

Total dissolved solids

Comments

A. Several hundred yards of ~~cattails~~ catails are present on both sides of
~~B.~~ this sample location
~~C.~~
~~D.~~

Latl. N 33° 31.285

Long. W 117° 10.792

Map drawing marked on airphoto YES / NO

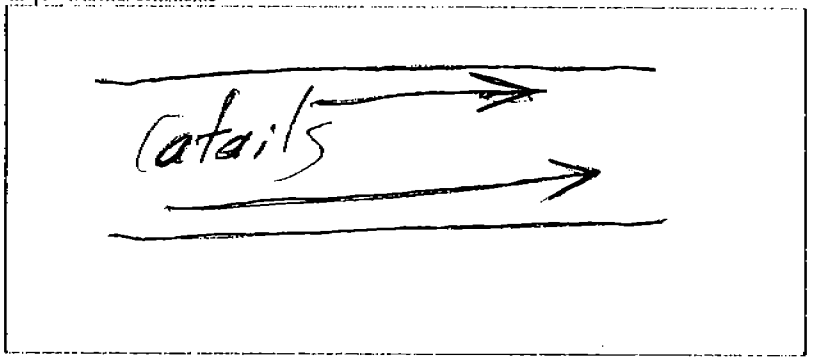
Insects Collected YES / NO

GPS Reading YES / NO

0483296 e

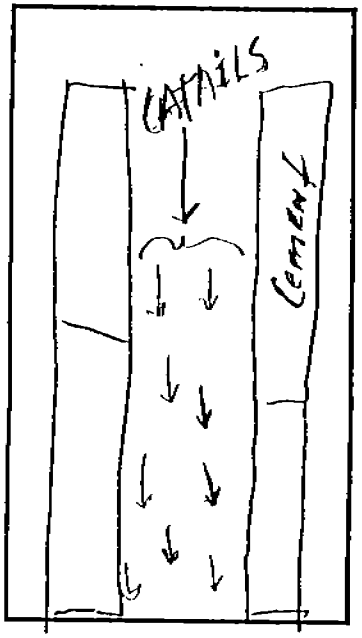
3709109 N

Map/ additional comments



SMR-9

Riffle Sample Locations



Length
Width

Comments

INSECT COLLECTION DATA FORM

Date/Time 3/23/97 15:15

Collector(s) RK, MC

Stream Murrieta Creek

Sample Number SMK-9 / C3

County Riverside

Township _____ Range _____

Weather _____

Air/ Temp. _____

Reach SMK-9

N 33° 31.285
W 117° 10.792
Elevation 1136'

No insects to collect.

This stream has been channelized, with acres & acres of cattails & other exotic freatophytes growing in the cement embankments

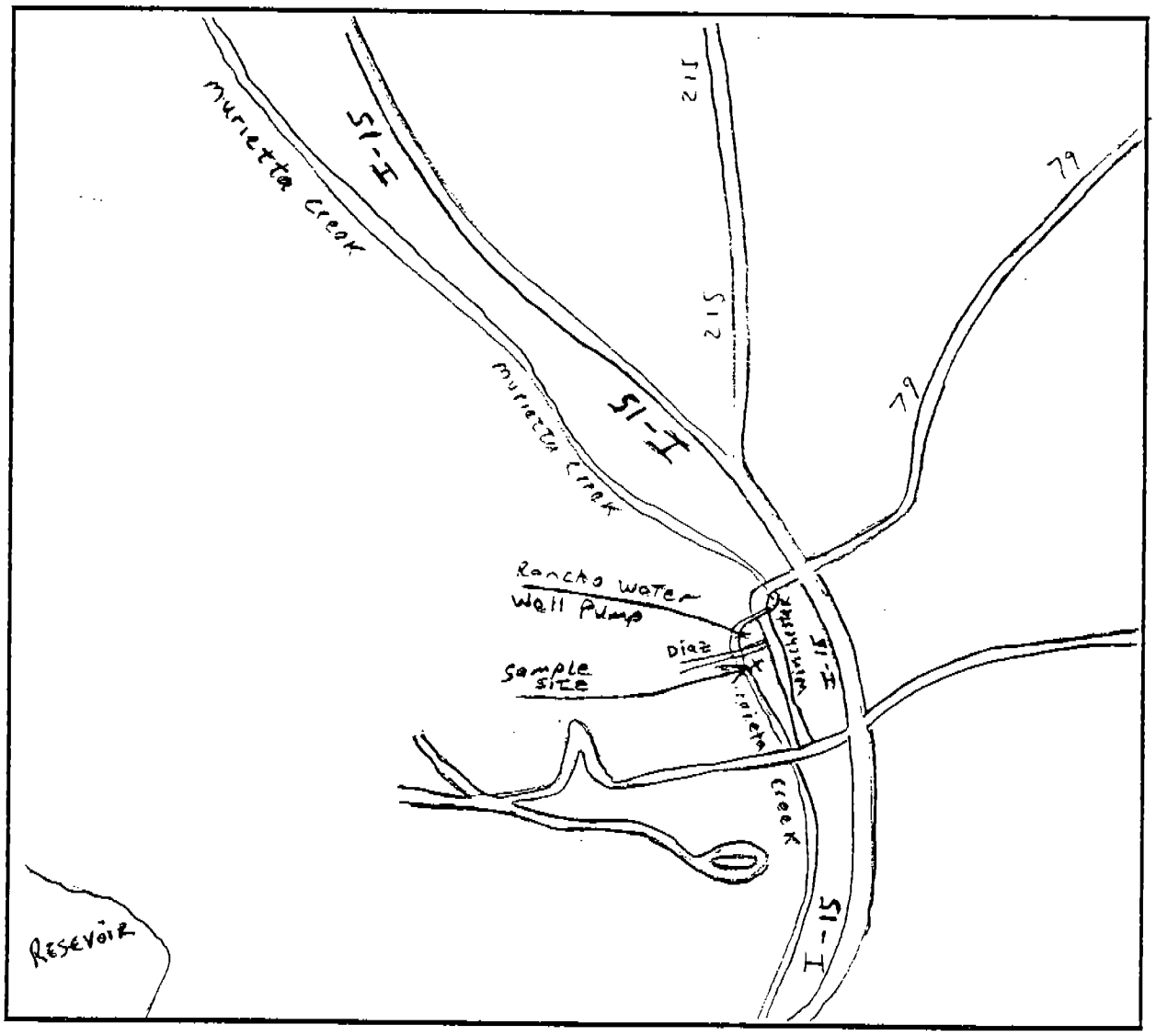
Hand Map of Stream location

Date 3-25-97

Author of Map MC

3/3

Field Crew MC, RK



SMR-9 (Murrieta Creek)

Going North on I-5 get off at the 79 North exit. Instead of going North on 79 Turn left Toward Temecula. Take Diaz street To Winchester. Road at corner runs behind parking lot and stores. The water quality site was ¼ mile from Diaz and Winchester intersection. There was a Rancho Water Well pump near the sample site. There also was a resevoir accross the road from the pump up on the hillside.

SMC-1

Water Quality - Field Data Collection Sheet

Date 3/21/97 Time 9:40 am

Collector(s) RNK

Stream San Mateo Creek

Weather OVERCAST

Air/Temp. ~ 70°F

Reach SMC 1

Page 1 of 4

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO2 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	S. SOLIDS (TDS)	SALINITY (%)
A SMC1	18°C	.5 ft/m	7.7	9:45	9.0	2.1	>.01		6.1X10	.34	Ø
B.		ft/m							.68 on	g/l	
C.		ft/m							HACH unit		
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

½ thickness of meter line above zero = Ø

Comments

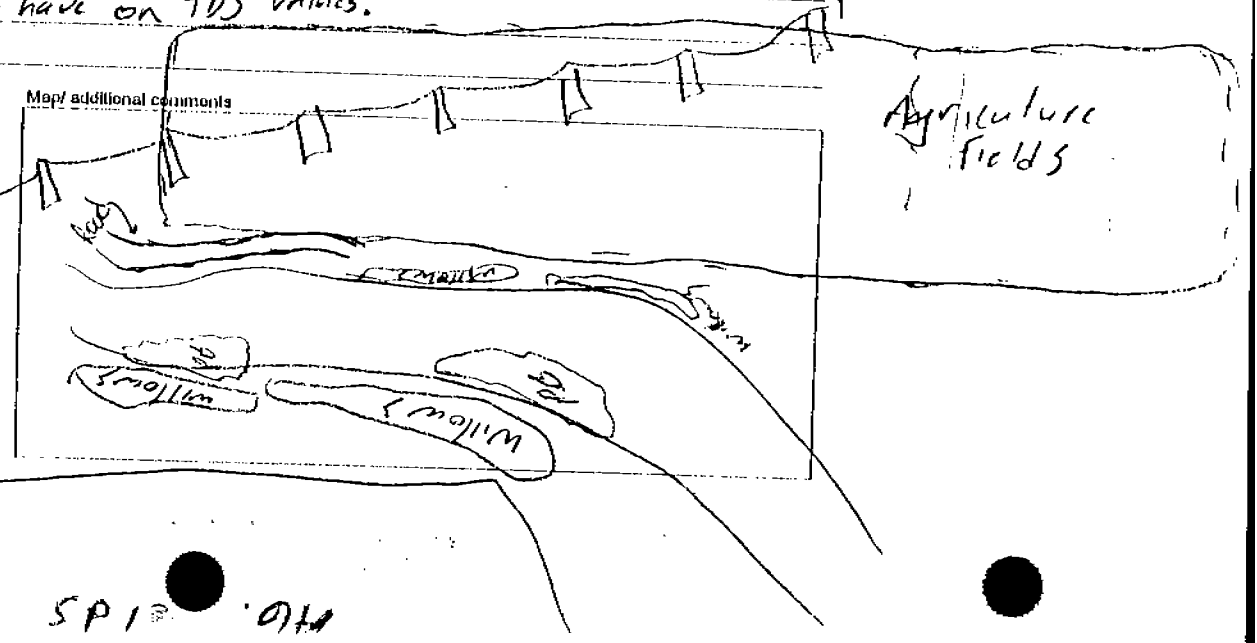
A. Relative to the embediness observed the conductivity & TDS values were lower than I expected. Question, Rob do zenobiotic compounds make water more or less conductive? what effect do they have on TDS values.

B.

C.

D.

Map/ additional comments



Latt. N 33° 24' 23.22"

Long W 117° 34' 31.80

Map drawing marked on airphoto (YES) / NO

Insects Collected (YES) / NO

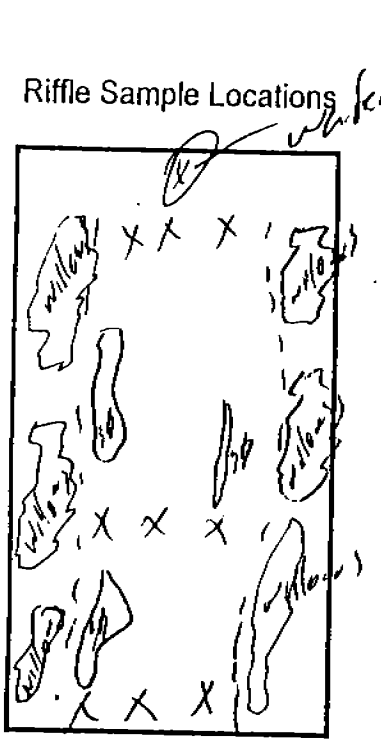
GPS Reading (YES) / NO

elevation 48'

SP1 .0H

SMC-1

Riffle Sample Locations



Length 27 m
Width 5 m

INSECT COLLECTION DATA FORM

Date/Time 3/21 9 15

Collector(s) RNK, MK, BO, AA.

Stream San Mateo Creek

Sample Number SMC 1

County San Diego County

Township N 33° 24' 23.22 Range W 117° 34' 31.80

Elevation 48'

Weather High Clouds

Air/ Temp. 2

Reach SMC 1 by tomato fields

Comments

This site is downslope from several miles of agriculture land (growing tomatoes) on both sides of the stream. Bruce took photos here, algal material est ≈ 20-30%

Alex Aho, CDFG, with us.

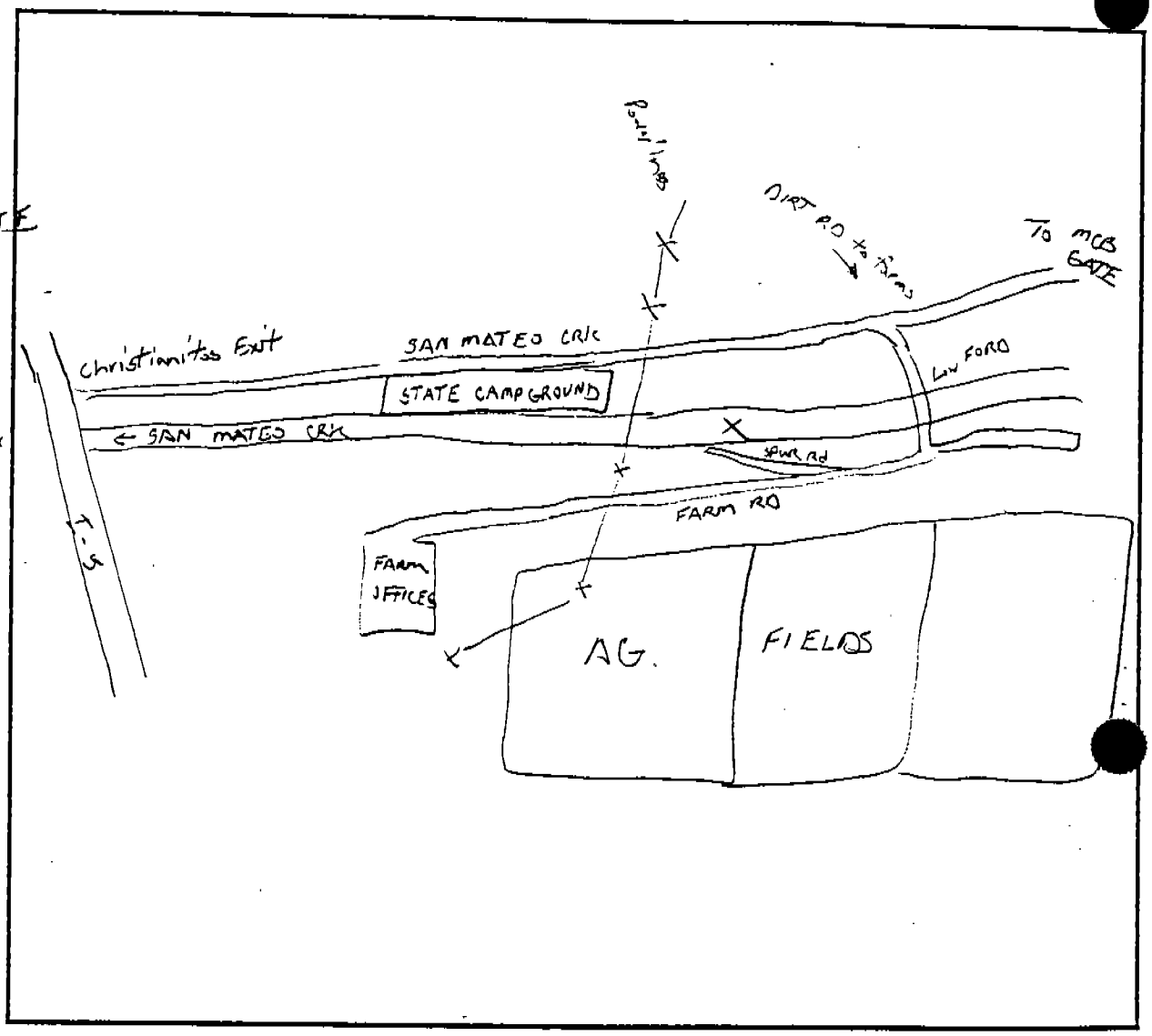
Hand Map of Stream location

Date 3-21-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SMC-1

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Location: SMC-1

Date:

Order: Family Genus Species	Sample site Tallies 1.1	1.2	1.3
DIPTERA			
Tipulidae	42	2	78
Tipula sp.		2	
Simulidae	298	121	128
Simulium vittatum	18	17	4
Chironomidae			
Chironomidae	14	184	194
(All others)	88	118	156
Stratiomyidae	1	Ø	Ø
Ephydridae	10	8	12
EPHEMEROPTERA			
Baetidae	221	314	356
Caenidae	64	81	121
ODONATA			
Coenagrionidae	6	1	Ø
Libellulidae		3	
Aeshnidae	1		
Gomphidae			1.
TRICOPTERA			
Hydropsyche sp.			1
MEGALOPTERA			
Neohermes californicus		3	
COLEOPTERA			
Dryopidae (Larvae)	23	1	2
Elmidae	18	9	3
Gyrinidae (Larvae)	4	1	3
(Adults)	2	5	2
Dytiscidae	16	21	6
Hydrophilidae (Adults)	1	2	1
	832	893	1068

SMC-2

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 16:45

Weather High Clouds not clear

Page 1 of 4

Collector(s) RWK, BO, ML

Air/Temp. ≈ high 70° F

Stream San Mateo Crk

Reach SMC 2 (below Ranger 314)

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	TDS S. SOLIDS	SALINITY (‰)
A. SMC2	17°C	.9 ft/m	7.5	14:50	12	2.2	<.1		.57 mo/cm	.29 g/L	<.01 ppt
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A. Spawning gravel present 6 meter x 6 meter section @ SMC 2.2 site (Heavily embedded) PSG

B. Lg Rocks 10" x 10" all the way down to fine gravel present Riparian community well established along both banks

C.

Lat. N 33° 25.404

Long. W 117° 31.881

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

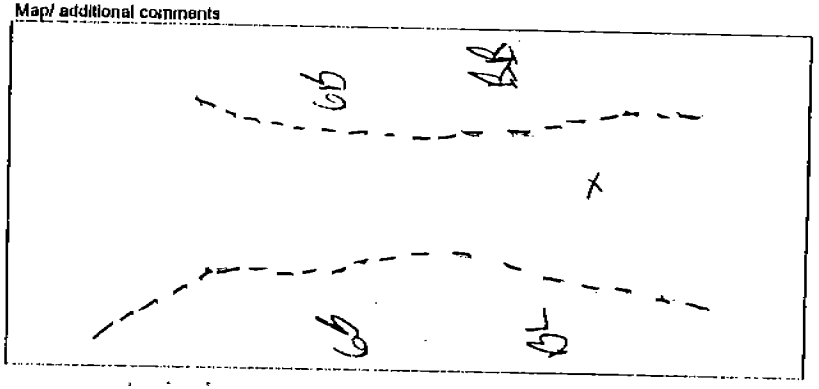
GPS Reading YES / NO

045 0530e

3698592 n

Elevation 171 Feet

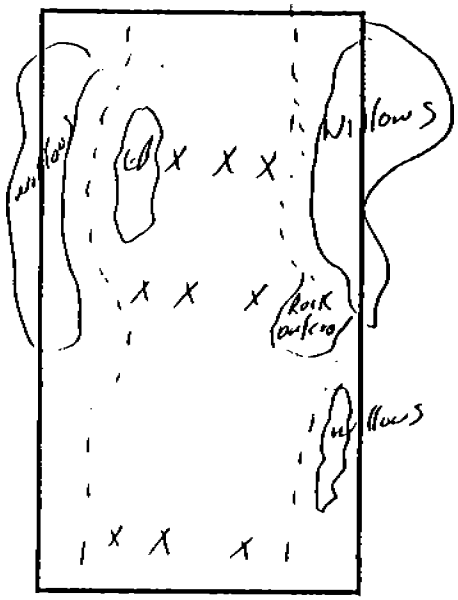
Map/ additional comments



SMC-2

~~SMC-2~~

Riffle Sample Locations



Length 20 meters
Width 6.5 meters

INSECT COLLECTION DATA FORM

Date/Time 3/20 1650

Collector(s) RNK, BO, ML

Stream San Mateo (below Range 314)

Sample Number SML 2.1 2.2 2.3

County Sandiego

Township 0450530e Range 3698592n

elevation 171 Feet

N 33° 25.404

W 117° 31.881

Weather Clear High clouds

Air/ Temp. ≈70°

Reach SMC2

Comments

Horse-hair worm from SMC # 2.2 is in seperate jar. Nice Corendallis caught here ≈1" in length (Kob not cyallis)

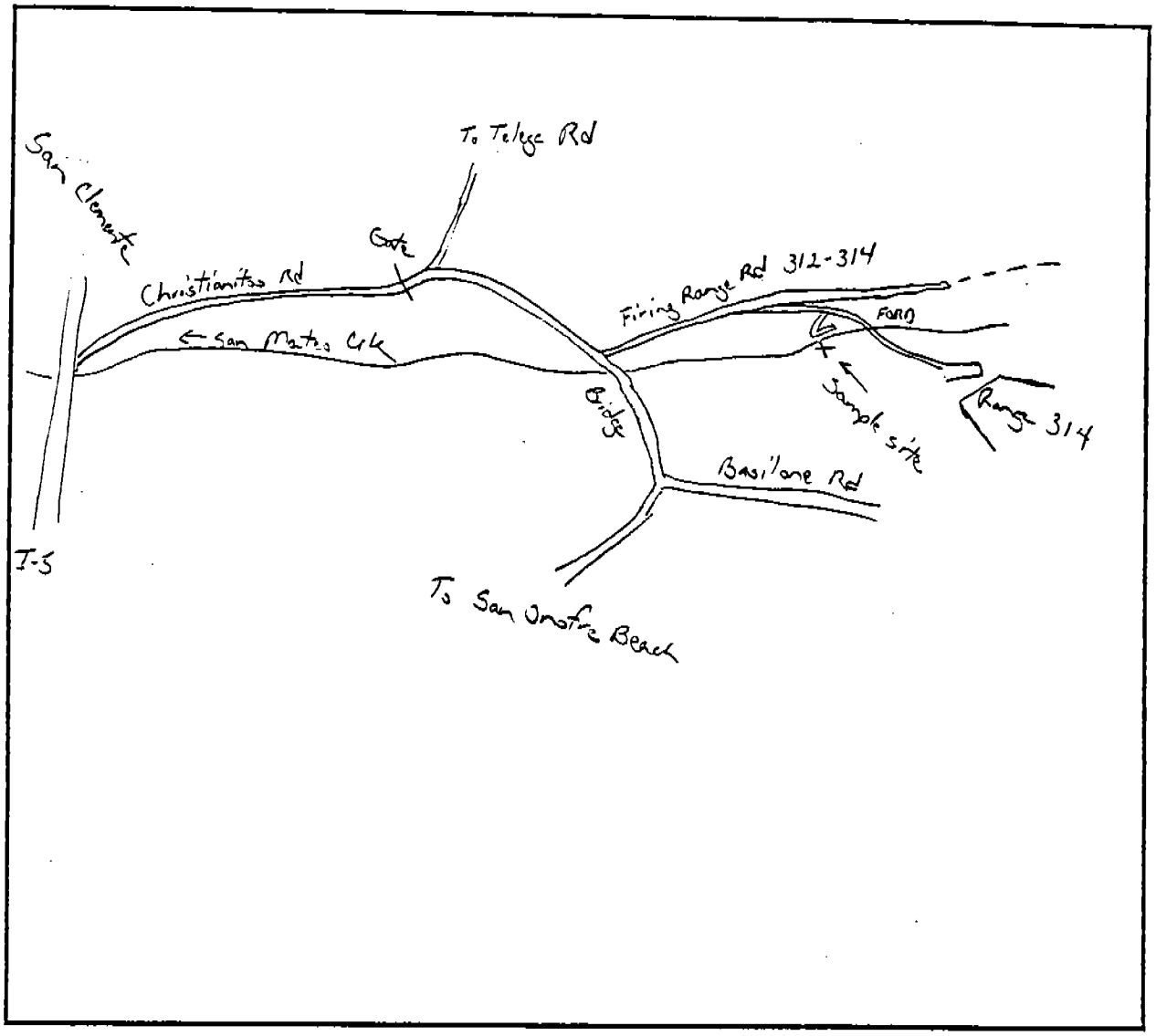
Hand Map of Stream location

Date 4/7/97

Author of Map Bruce O

Field Crew RK, BO, MC

3/4



SMC-2

Take I-5 to Christianitos Rd go thru gate, turn left on Range 314 Road before crossing bridge over San Mateo. Go up about one mile turn right on Range 314 Road. Turn off on dirt road to the right before reaching road crossing.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Date:

Location: SMC - 2

Order: Family Genus Species	Sample site Tallies 2.1	2.2	2.3
Diptera			
Tipulidae	32	12	45
Simuliidae	12		82
Simulium vittatum		36	45
Psychodidae	6	14	18
Chironomidae	12	14	78
Chironomidae (All others)	38	21	149
Ephemeroptera			
Baetidae	48	531	662
Caenidae	12	282	341
Siphlonuridae	2		6
Plecoptera			
Amphinemuridae			
Malenka sp.			3
Isoperlinae			
Isoperla sp.			4
Nemouridae			1
Tricoptera			
Hydropsychidea			1
Megaloptera			
Corydalidae		8	3
Coleoptera			
Dryopidae (larvae)	6		2
" (Adults)	1		
Elmidae	1		1
Gyrinidae (larvae)	2		
Psephenidae			
Psephenus sp.		2	1
Dytiscidae	3	2	2
Cybister sp.		1	4
Haliplidae			11
Haliplidae (Adults)	2	18	3
Hydrophilidae (Adults)	3	16	6
	185	957	1468

SMC - 3

Water Quality - Field Data Collection Sheet

Date 3/21/97 Time 1700

Collector(s) RNK, BO, MC

Stream San Marco Creek

Weather High clouds, clear

Air/Temp. ≈70° F

Reach SMC 3

Page 1 of 4

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (PPm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	S. SOLIDS (TDS)	SALINITY (o/oo)
A. SMC3	18°c	1.60 m	6.8	1705	8.4	1.6	<.1		.36	.18 g/l	5X10
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A. Lg cobble were present throughout this creek. Cobble is very embeded hard
B. to move while KiLK net sampling
C.
D.

Lat. N 33° 28' 08.62

Long. W 117 28' 35.43

Map drawing marked on airphoto YES / NO

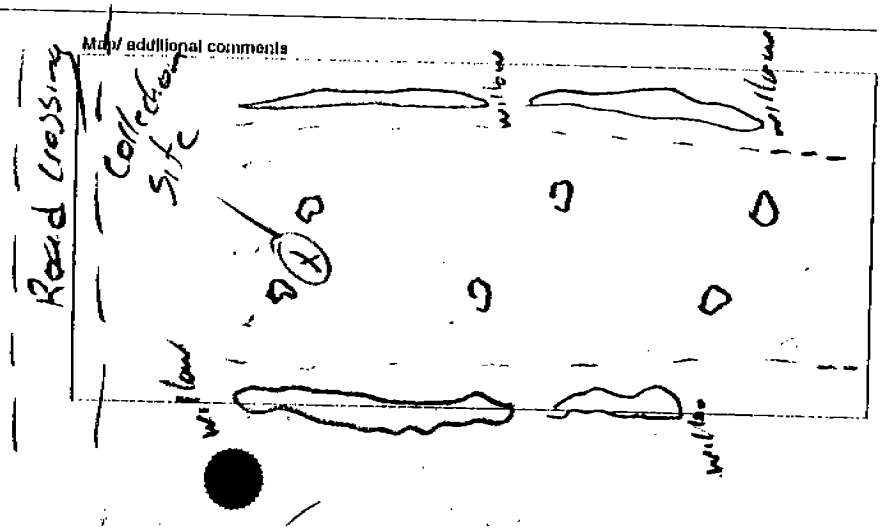
Insects Collected YES / NO

GPS Reading YES / NO

0455725e

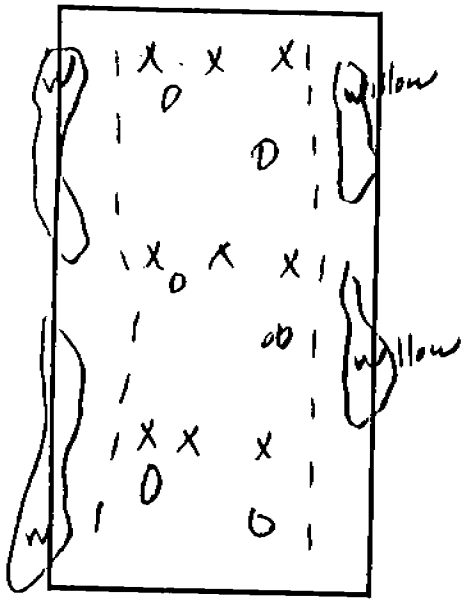
3703367n

Map/ additional comments



SMC3

Riffle Sample Locations



Length 22 meters
Width 7 meters

INSECT COLLECTION DATA FORM

Date/Time 3/21/97 1710
Collector(s) RWK BO MC
Stream San Mateo Creek
Sample Number SMC 3
County Sandiego
Township N 33° 28' 08.62 Range W112° 28' 35.43

Weather Clear high clouds
Air/ Temp. 70° F
Reach Below Telegraph road crossing SMC ≈ 200'

Comments

Substrate is very embeded, hard to loosen while Kick net sampling

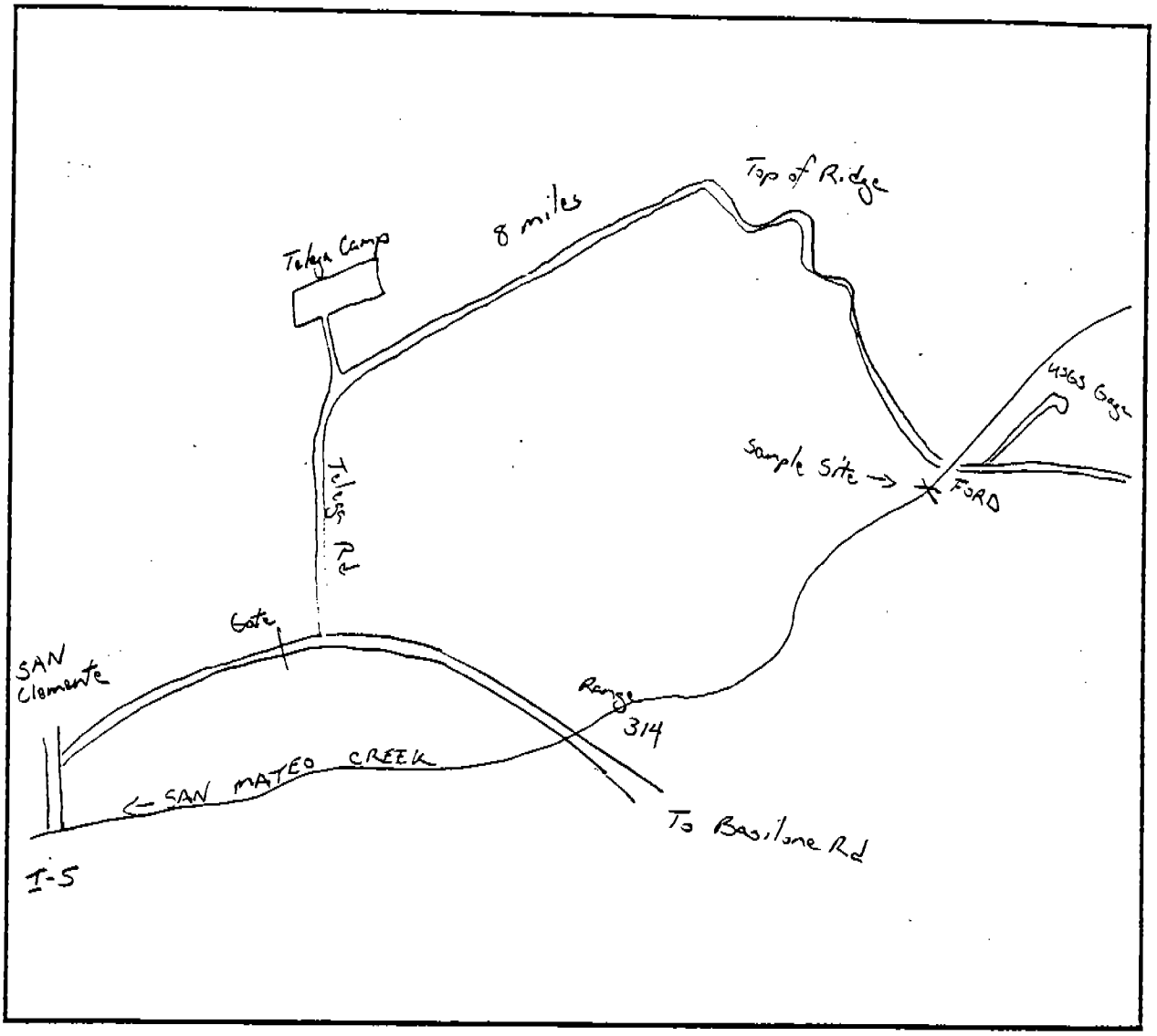
Hand Map of Stream location

Date 4/7/97

Author of Map Bruce O

Field Crew RK, BO, MC

3/4



SMC-3

Take Telega Road from North end of Base up + over ridge into SMC canyon. At low water crossing walk DS 200'

Takes 30-45 min +. get here from I-5. 9 stream crossings on Telega Creek, OK for 2-WD trucks.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Date:

Location: SMC -3

Order: Family Genus Species	Sample site Tallies 3.1	3.2	3.3
DIPTERA			
Tipulidae		1	
Simuliidae	18	8	
Chironomidae	3	2	4
Chironomidae (all other)	7	4	3
Stratiomyidae	1	6	
Ephydridae	8	3	
EPHEMEROPTERA			
Baetidae	46	51	69
Caenidae	12	14	43
ODONATA			
Gomphidae		1	
PLECOPTERA			
Amphinemuridae	6	9	19
Isoperline	3	14	7
Nemouridae	6	8	16
TRICOPTERA			
Hydropsyche oslari	6		35
Hydroptilidae	4		22
Polycentropoidae			3
Lepidostomatidae			
Lepidostoma sp.		43	
MEGALOPTERA			
Corydalidae	1	1	2
COLEOPTERA			
Dryopidae (Adults)	2	1	2
Gyrinidae	3		2
Dytiscidae	5	9	1
Hydrophilidae (Adults)		2	4
HEMIPTERA			
Gerridae	1		1
	132	177	233

SMC-4

Water Quality - Field Data Collection Sheet

Date 3/21/97 Time 12:05 noon

Weather High clouds

Page 1 of 4

Collector(s) RNK, BO, MC, Alex Ahar

Air/Temp. ≈ 80°F

Stream SMC @ USGS upper gage

Reach 1st pool US gage

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	~~S. SOLIDS~~ TDS	SALINITY (‰)
A.	18.0	1½ ft/m	7.5	~1200	9.6	2.1	Neg		60	.31	.2
B.		ft/m								g/l	
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A.

B.

C.

D.

Lat. N 35° 28' 14.46"

Long. W 117° 28' 18.37"

elev. 373

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

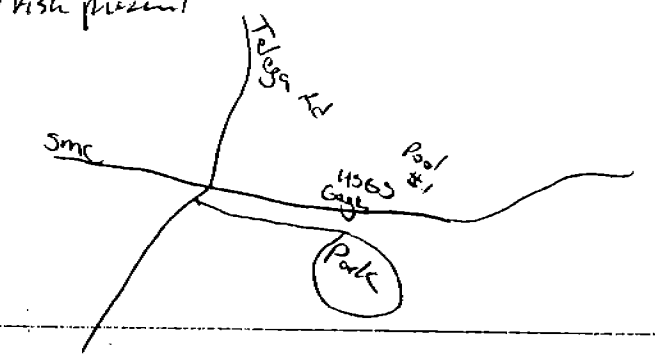
N3703567

E0456162

elev. 392'

Map/ additional comments

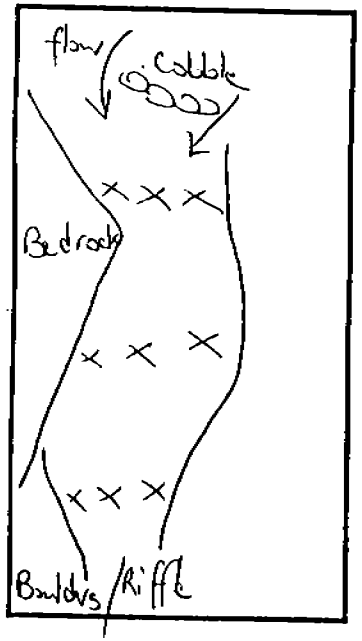
Mosquito Fish present



Case S[illegible]gs

SMC-4

Riffle Sample Locations



Length 13.5m
Width 7m

INSECT COLLECTION DATA FORM

Date/Time 3/21/97

Collector(s) BO, MC, RK, Alex Vejar

Stream San Mateo Crk, Devil Canyon Confl. UPS of

Sample Number SMC-4.1

County San Diego Co.

Township _____ Range _____

Weather Clear

Air/ Temp. _____

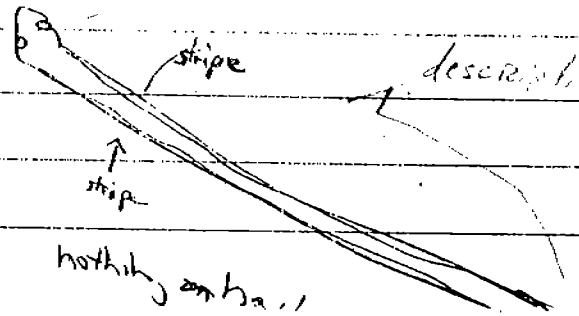
Reach _____

Comments

Pool habitat above Devil Canyon Confluence

Mosquito fish or Bullheads present.

4 & stripe garter snakes @ pools/riffles



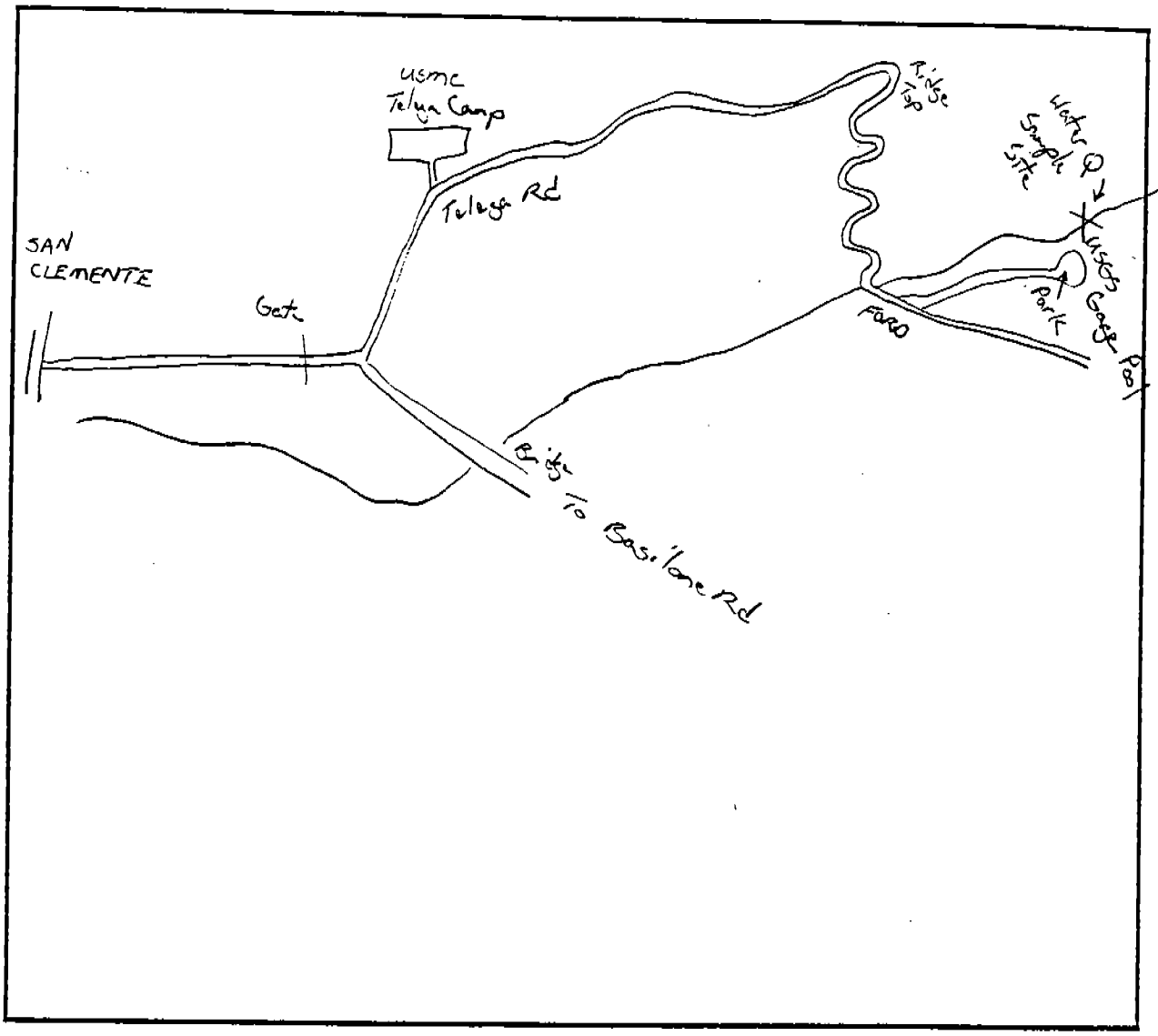
Hand Map of Stream location

Date 4/7/97

Author of Map Bruce O

Field Crew Bo, MC, RK, AA.

3/4



SMC-4

Sample Water Q @ USGS Gage pool, just UPS in riffle area. Then walked 3/4 mile UPS to Devil Canyon + sampled insects in riffle/pool above confluence

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Location: SMC-4

Date:

Order: Family Genus Species	Sample site Tallies 4.1	4.2	4.3
DIPTERA			
Chironomidae	2		
Chironomidae (all others)	5		3
Stratiomyidae	2		
Ephydridae	4		
EPHEMEROPTERA			
Baetidae	55	13	63
Caenidae	10	12	8
Leptophlebiidae			1
Siphlonuridae		1	
ODONATA			
Coenagrionidae		4	1
Gomphidae	1	1	1
PLECOPTERA			
Amphinemuridae	2		
Isoperlinae	12	1	1
TRICOPTERA			
Hydropsychidae	12	10	
Hydroptilidae	7	16	
Philopotamidae			
Wormaidia sp.	8	6	
MEGALOPTERA			
Corydalidae	2		
COLEOPTERA			
Elmidae	1		
Dytiscidae	6	4	4
Haliplidae	2		
Hydrophilidae		1	2
	131	69	84

SME-5

Water Quality - Field Data Collection Sheet

Date_____ Time_____ Weather _____ Page 1 of 1

Collector(s) _____ Air/Temp. _____

Stream _____ Reach _____

SITE	TEMP.	DEPTH	Ph	TIME	D.O.	NO2	NH4	PO4	COND.	S. SOLIDS	SALINITY
A.		ft./m									
B.		ft./m									
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments

A.

B.

C.

D.

Map/ additional comments

Not sampled due to time constraints

Lat. _____

Long. _____

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

SMC-6

Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 1150

Weather Cool, slightly overcast

Page 1 of 4

Collector(s) RK

Air/Temp. 70°F

Stream San Mateo Below Falls

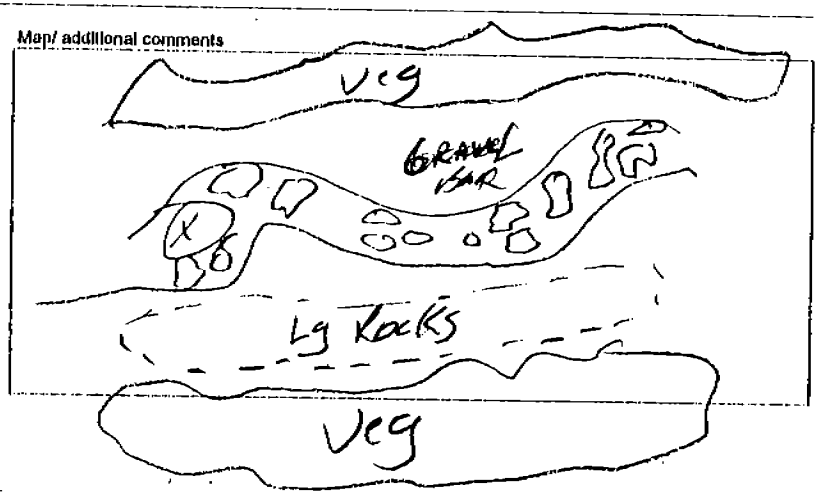
Reach SMC 6

SITE	TEMP.	DEPTH	Ph	TIME	ppm D.O.	mg/l NO3	mg/l NH4	~~PO4~~	cs/cm COND.	TDS ~~S. SOLIDS~~	% ~~SALINITY~~
A. SMC 6	17.0°C	3' @ m	7.0	11:53	8.5	2.1	.2		.59	.30 g/l	0
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A. California newt, Gambosia, tadpoles, 2 Stripe Garter Snake were all seen here
B. The Stream morphology was one of large substrate 3'-5' diameter B smaller
C. Spawning gravel was not located. There were many (i.e. relative frequency) small plunge
D. pools spaced closely together.

Map/ additional comments



Lat. N 33° 32' 58.65

Long. W 117° 23' 46.32

Map drawing marked on airphoto (YES) NO

Insects Collected (YES) / NO

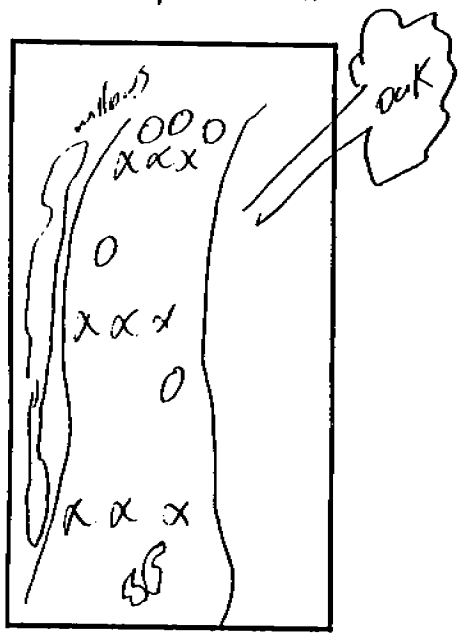
GPS Reading (YES) / NO

0463277e
3712221 n

Elevation 1264

SMC-6

Riffle Sample Locations



Length 15 meters
Width 3 meters

INSECT COLLECTION DATA FORM

Date/Time 3/25/97

Collector(s) RK, MC

Stream San Mateo below confluence South FK Falls

Sample Number SMC 6.1, 2, 3

County Riverside

Township N 33° 32' 38.65" Range W 117° 23' 46.23"

Elevation 1264

Weather cool, high clouds

Air/ Temp. ≈ 70°F

Reach SMC6 below confluence southwest of parking lot. Below ford crossing of unused road

Comments

After site selection we found there to be a lot more silt & sand than we had expected to find. This was the most homogeneous reach we could find relative to SMC-3 and SMC2. I would call this a LGK anywhere else. It does resemble other sample sites though. We found 4 California Newts in our sample area.

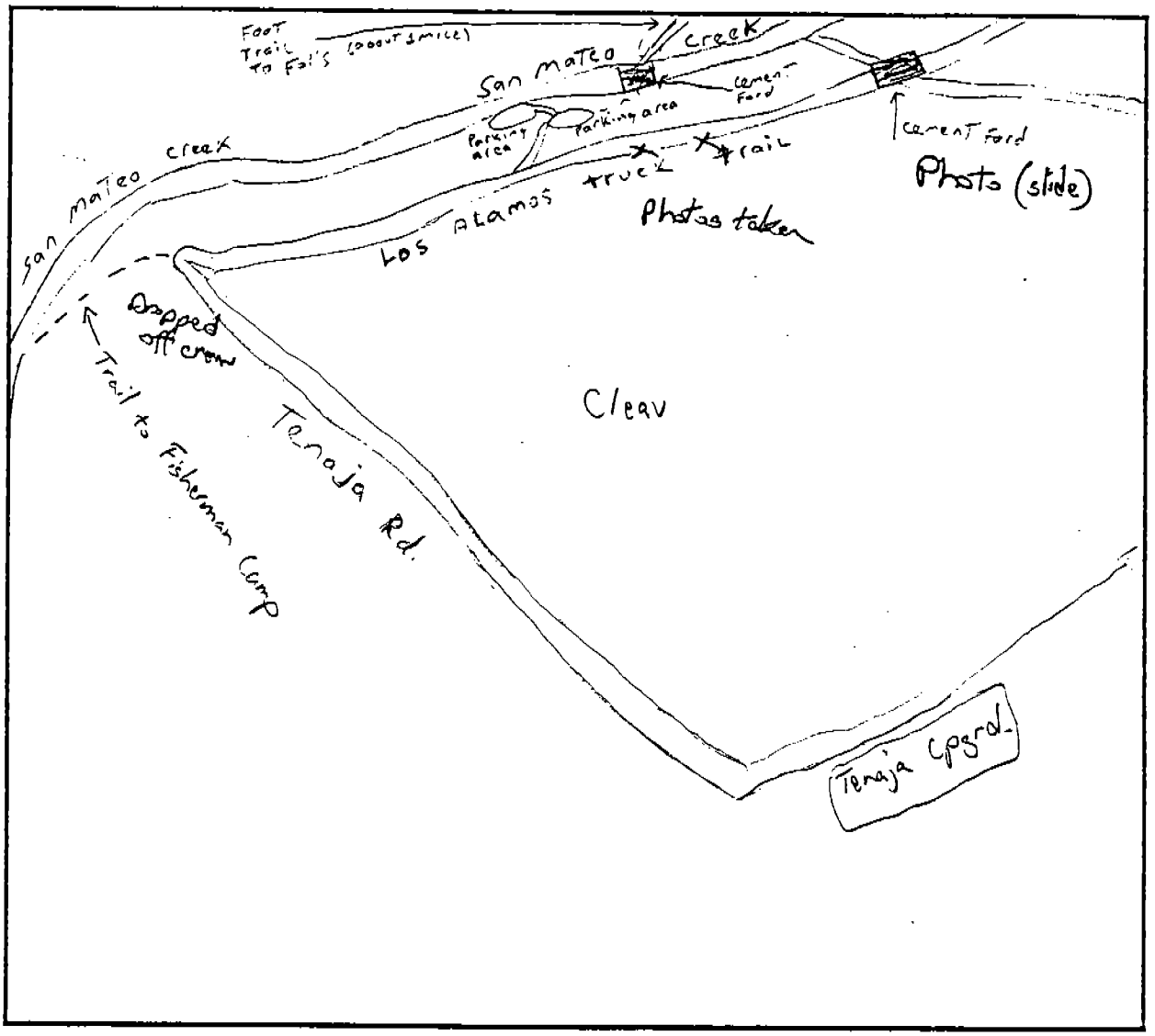
Hand Map of Stream location

Date 3-25-97

Author of Map MC

Field Crew MC, RK

3/4



SMC6 – Below falls in cleveland Nat. Forest

Water quality and insect samples were taken 25 yards upstream of lower parking area along San Mateo Creek.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Location: SMC-6

Date:

Order: Family Genus Species	Sample site Tallies 6.1	6.2	6.3
DIPTERA			
Chironomidae	1	2	
Chironomidae (All others)	1	4	
Muscidae		1	
EPHEMEROPTERA			
Baetidae	21	19	18
Caenidae	4	1	4
ODONATA			
Coenagrionidae	3		2
Gomphidae	1		1
PLECOPTERA			
Amphinemuridae	1		2
Isoperlinae	2		2
TRICOPTERA			
Hydropsychidae	6	1	
Hydroptilidae	3	2	2
Philopotamidae			3
COLEOPTERA			
Dryopidae (Adults)	1	1	2
Elmidae	1		
Dytiscidae	7	2	8
Haliplidae	6	1	2
Hydrophilidae (Adults)	1		
HEMIPTERA			
Gerridae		1	
Belostomadidae		1	
Corixidae			1
	59	36	48

SOC - 1

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 1615 Weather Clear Page 1 of 4

Collector(s) KWK Bo MC Air Temp. ~80°F

Stream San Onofre (Below 207A Range) Reach SOC 1

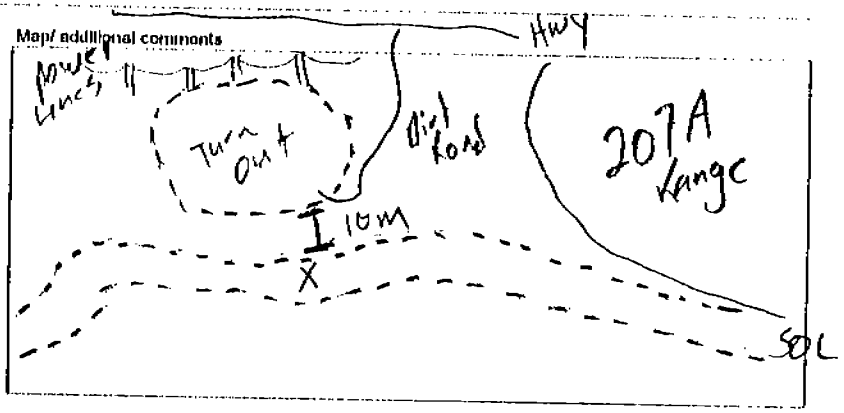
SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	TDS ~~S. SOLIDS~~	SALINITY (%)
A SOC 1	25°c	.9 @ m	6.9	1520	8.1	3.5	>.07		.46 ms/cm	.48 g/l	
B. SOC 1	13	.5 @ m		0730	9.2						
C.		ft./m									
D.		ft./m									
		ft./m									
		ft./m									
		ft./m									

3/21/97

Comments

1. Sample location is ½ mile below Range 207A.
2. We sampled thawing for temp @ 24° we sampled a sub surface bank
3. Seepage area for Temp 16° (change of 8°).
4.

Map/ additional comments



Lat. N 33° 23.328'

Long. W 117 32.632'

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

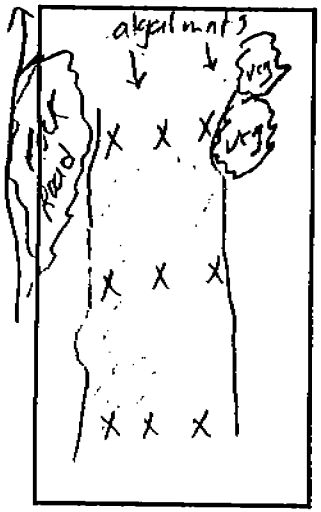
GPS Reading YES / NO

0449428 E'

3694501 N

SOC-1

Riffle Sample Locations



Length 32 meters
Width 5 meters

INSECT COLLECTION DATA FORM

Date/Time 3/20/97
Collector(s) RWK, BO, MC
Stream San Onofre Creek
Sample Number SOC1
County Sandiego
Township N33° 33.328' Range W117° 32.632'
Elevation 62'
0449428 e
369450 N

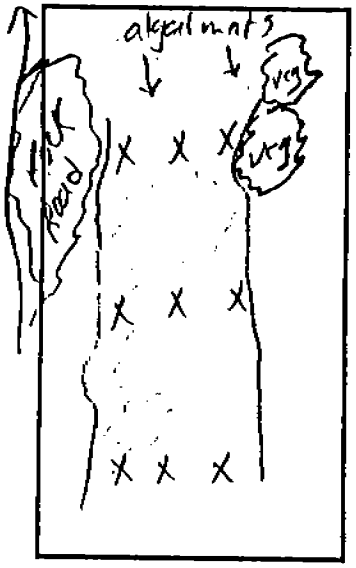
Weather Clear, Easterly wind
Air/ Temp. 80°F Dry hot
Reach SOC

Comments

Algal mats were continous throughout the reach, warmer water & possibly ↑ organic input from the STF upstream appear to have increased diversity here
This site is warm, slow flowing, & 1° productivity seems to be thriving thus ↑ #, Kel abundance and overall ↑ diversity values. Collected 10-15 sanguivours
3 Photos taken (1 of pool DS [illegible]ple site)

SOC-1

Riffle Sample Locations



Length 32 meters
Width 5 meters

INSECT COLLECTION DATA FORM

Date/Time 3/20/97
Collector(s) RWK, BO, MC
Stream San Onofre Creek
Sample Number SOC1
County San Diego
Township N33° 33.328' Range W117° 32.632'
Elevation 62'
0446428 E
369450 N

Weather Clear, Easterly wind
Air/ Temp. 80°F Dry hot
Reach SOC

Comments

Algal mats were continous throughout the reach, warmer water & possibly ↑ organic input from the STF upstream appear to have increased diversity here. This site is warm, slow flowing, & 1° productivity seems to be thriving thus ↑ #, Rel abundance and overall ↑ diversity values. Collected 10-15 sanguivorous
3 Photos taken (1 of pool OS sample site)

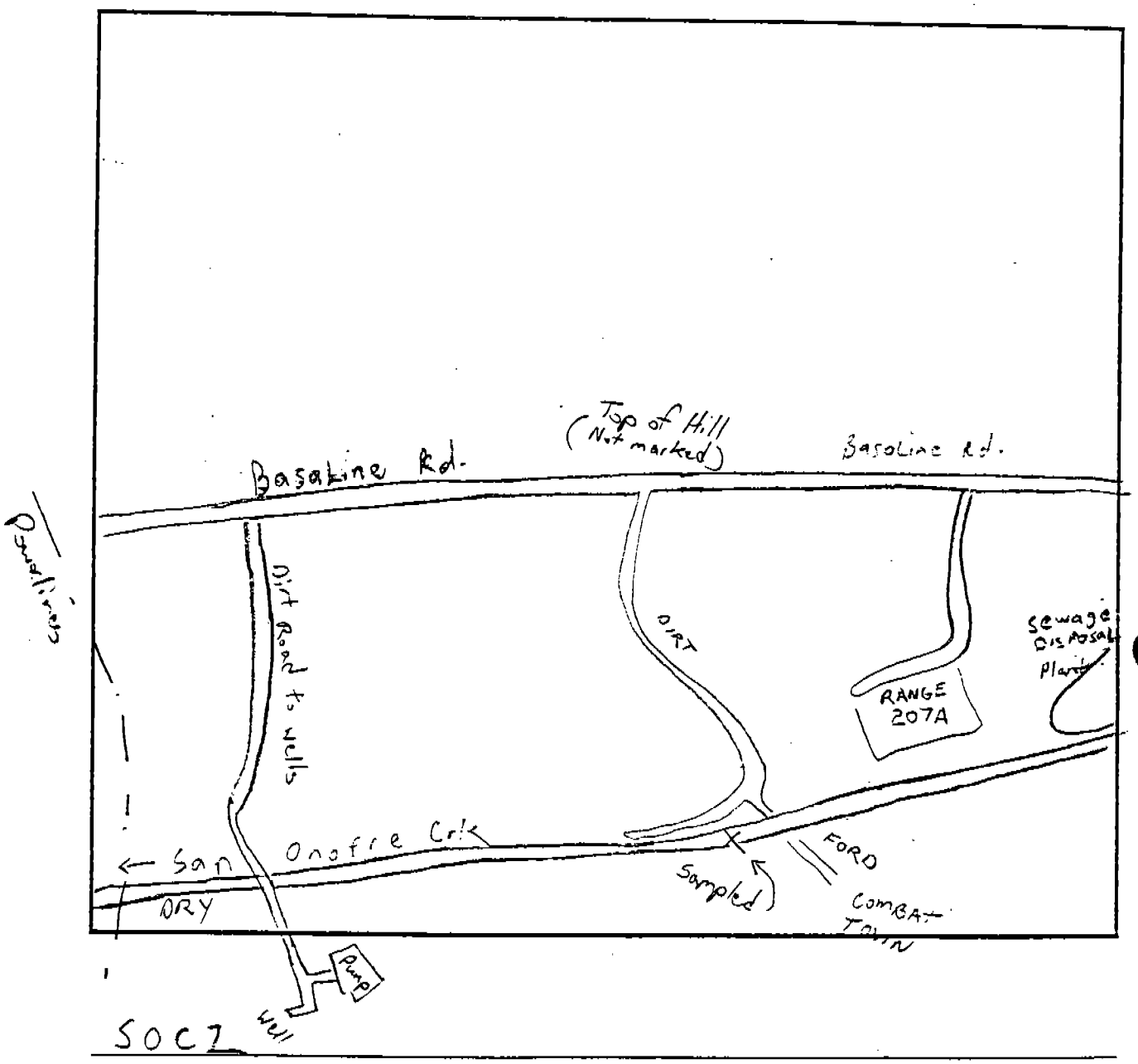
Hand Map of Stream location

Date 3-20-97

Author of Map MC

Field Crew MC. BO. RK

3/4



SOC7

WATER quality and insect samples were taken ½ mile downstream of Firing range 207A.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN ONOFRE CREEK

Location: SOC - 1

Date:

Order: Family Genus Species	Sample site Tallies 1.1	1.2	1.3
DIPTERA			
TIPULIDAE	2	4	1
SIMULIIDAE	32	50	35
CHIRONOMIDAE	152	190	140
CHIRONOMIDAE (All others)	53	147	158
CERATOPOGONIDAE	16	30	4
EPHYDRIDAE	27	14	44
EPHEMEROPTERA			
BAETIDAE	515	613	502
CAENIDAE	53	60	31
LEPTOPHLEBIIDAE	54	18	11
LIBELLULIDAE	1		1
AESHNIDAE		2	1
GOMPHIDAE			4
COLEOPTERA			
DRYOPIDAE (larvae)	16	8	3
(Adults)	1	1	6
ELMIDAE	108	162	68
GYRINIDAE	6	15	2
PSEPHENIDAE	9	6	
DYTISCIDAE	14	9	3
HALIPLIDAE		7	8
HYDROPHILIDAE (larvae)	2	31	2
(Adults)	2	27	5
HEMIPTERA			
BELOSTOMADIDAE	2		
	1065	1397	1029

SOC - 2

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 11:10 Weather Sunny Page 1 of 4

Collector(s) RNK MC Air/Temp ≈ 80° F

Stream San Onofre South Fork below Horno Reach

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	~~S. SOLIDS~~ TDS	SALINITY (‰)
A.	21°C	ft/m	6.8	1110	9.4	2.4	0.3		8.2 x10	.43 g/l	1 ppt
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A. OFF Basaline road downstream of bridge leading to NBC Facility.
B. Stream was very narrow. Water was visibily less turbid than
C. other (ie SMR SMC lower sites) locations.
D.

Lat. N 33° 22.875'

Long. W 117° 29.147'

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

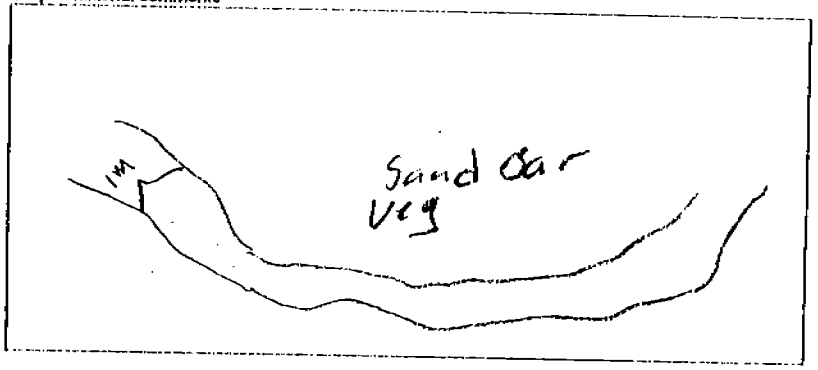
GPS Reading YES / NO

0454819e

3693664n

Elevation 360 feet

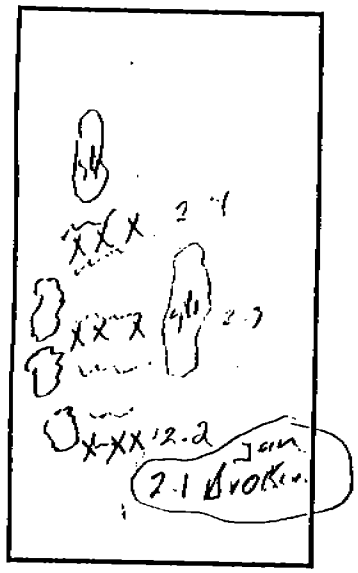
Map/ additional comments



SOC-2

~~SMC2~~

Riffle Sample Locations



Length 9m
Width 1.6m

INSECT COLLECTION DATA FORM

Date/Time 3/20/97 11:10

Collector(s) KK, BO, ML

Stream San Onofre south fork below Horno

Sample Number SOC 2.1, 2.2, 2.3

County Sandiego

Township N33° 22.872' Range 117° 29.146'

elevation 339 Feet

Weather Sunny

Air/ Temp 80°F

Reach SOC 2

Comments

Braided stream channel, water is visibly less turbid than other sites (ie SMK SMC) that we have sampled. Rocky substrate .5" to 1" size class, and smaller make up substrate. Embeddiness was less than other sites mentioned above.

Jar 2.2 is sample 1 2.3 is sample 2 & 2.4 is samp 4

several water snakes & mayfly adults

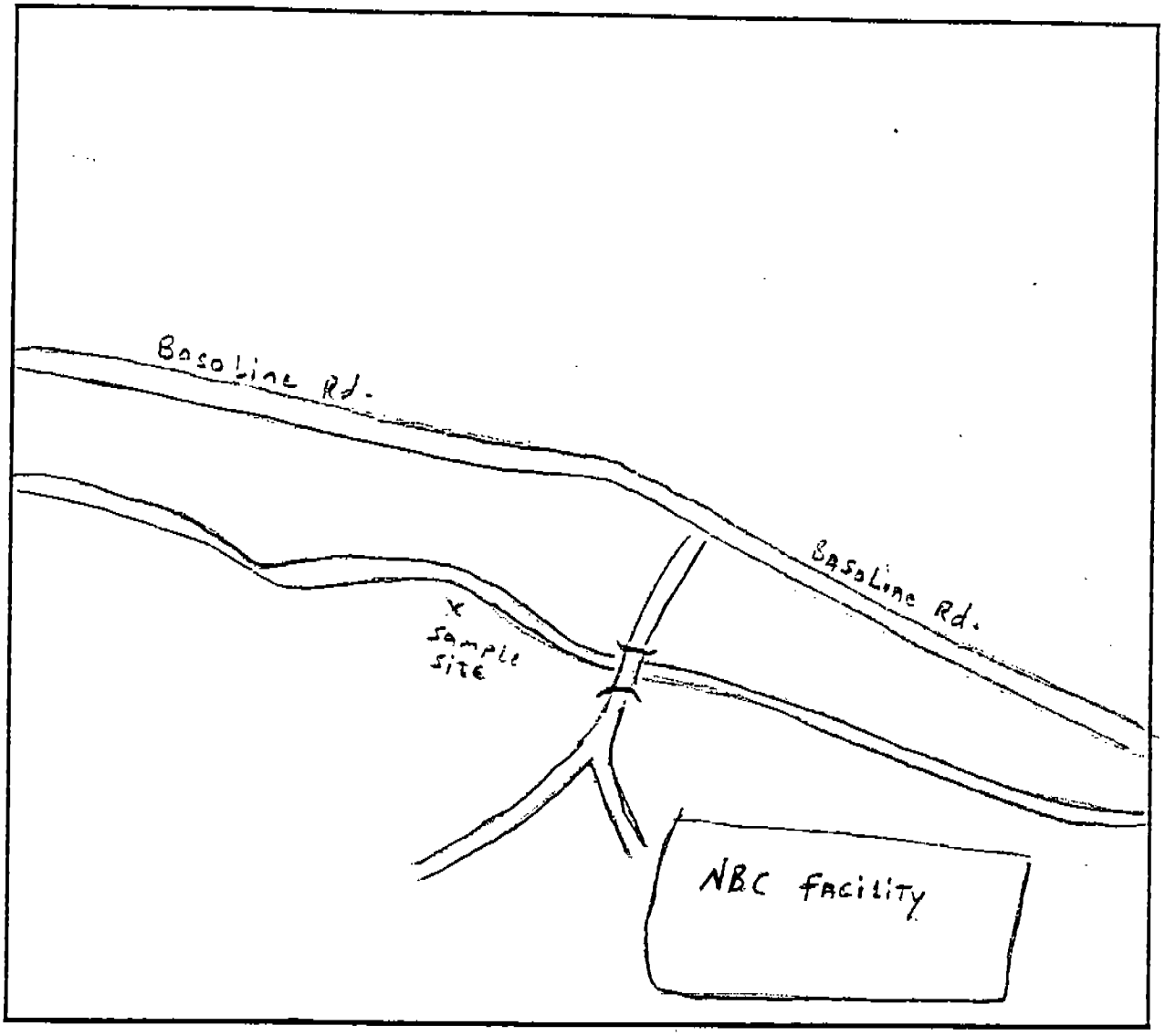
Hand Map of Stream location

Date 3-22-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SOC2

Water quality and insect samples were collected ½ mile downstream of bridge off Baseline Rd. before entering NBC Facility.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN ONOFRE

Location: SOC - 2

Date:

Order	Family	Genus	Species	Sample site Tallies 2.1	2.2	2.3
DIPTERA						
	TIPULIDAE			3		
	SIMULIIDAE			6	20	
	CHIRONAMIDAE			14	41	
	CHIRONAMIDAE (ALL OTHERS)			29	55	
	STRATIOMYIDAE				1	
	SYRPHIDAE				1	
	EPHYDRIDAE			1	4	
EPHEMOROPTERA						
	BAETIDAE			6	4	3
ODONTA						
	COENAGRIONIDAE			2	1	
	AESHNIDAE			2		4
	GOMPHIDAE			1	2	
MEGALOPTERA						
	CORYDALIDAE				2	
COLEOPTERA						
	DRYOPIDAE (LARVAE)			3	4	8
	(ADULTS)			2	1	4
	ELMIDAE			4	4	2
	DYTISCIDAE			2	6	2
	HALIPLIDAE (LARVAE)			6		
	(ADULTS)			5	5	6
HEMIPTERA						
	BELOSTOMADIDAE			1	Ø	Ø
				87	151	29

SOC-3

Water Quality - Field Data Collection Sheet

Date 3/22 Time 8 45

Collector(s) RNK, ~~B~~ MC

Stream San Onofre Creek

Weather High clouds

Air/Temp. ≈ low 70°F

Reach Below Case Springs (upper reach)

Page 1 of 2

NO Invertebrates collected here

SITE	TEMP.	DEPTH	Ph	TIME	ppm D.O.	mg/l NO3	mg/l NH4	PO4	cs/cm COND.	TDS ~~S. SOLIDS~~	% SALINITY
A.	15.5°C	3 (ft) m	6.2	8:45	8.1	2.9	.5		.21	.11 g/l	0
~~B.~~		ft./m									
~~C.~~		ft./m									
~~D.~~		ft./m									
		ft./m									
		ft./m									
		ft./m									

Comments

A. This pool was slow moving 1-2 CFS & 3'-4' deep. (under trees!)

~~B.~~ 1st pool below outflow pipe.

~~C.~~

~~D.~~

Latt. N 33° 27.02.74"

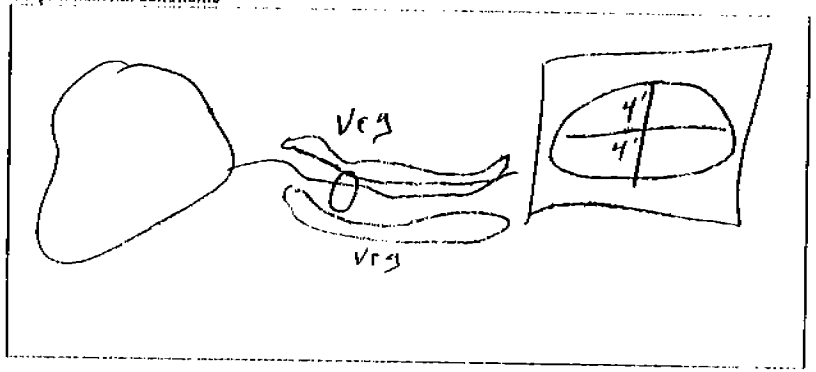
Long. W 117° 25' 20.34

Map drawing marked on airphoto YES / NO

Insects Collected YES / (NO)

GPS Reading (YES) / NO

Map/ additional comments



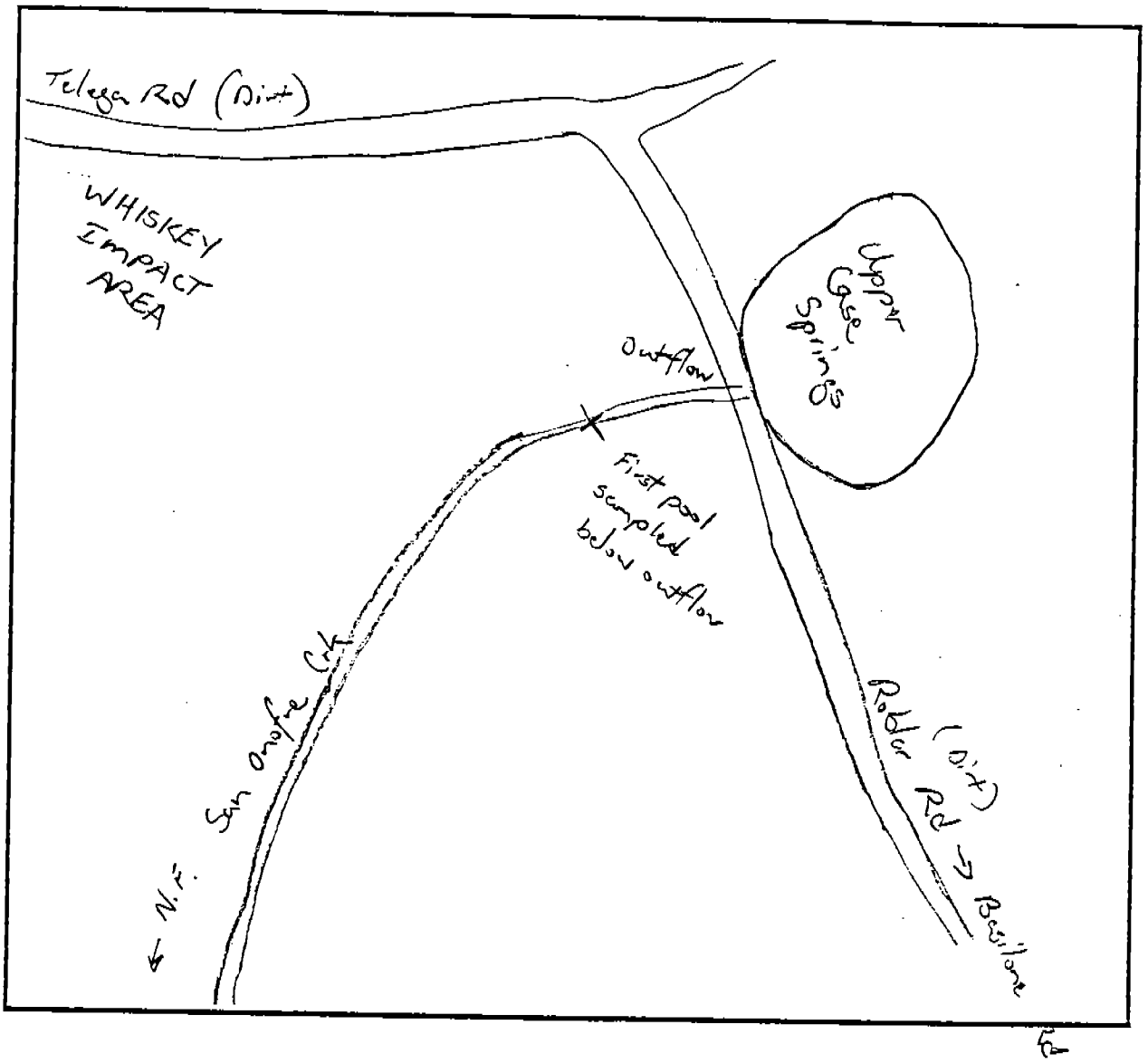
Hand Map of Stream location

Date 3-22-97

Author of Map MC

2/2

Field Crew MC, BO, RK



SOC3

Water quality samples were taken on the North Fork of San Onofre creek about 25 yards downstream of Case Spring Outlet.

RC-1

Water Quality - Field Data Collection Sheet

Date 3/24/97 Time 9:25

Weather Cloudy morning Clearing midday Page 1 of 4

Collector(s) RNK, MC, BO

Air/Temp. ≈70°C

Stream Robber Creek above Deluz confluence

Reach RC 1

SITE	TEMP.	DEPTH	Ph	TIME	D.O. (ppm)	NO3 (mg/l)	NH4 (mg/l)	PO4	COND. (cs/cm)	S. SOLIDS (TDS)	SALINITY (‰)
A. RC 1	22.5°C	.5 m	7.5	11:50	9.6	7.01	NE6		40	.20 g/l	0
B.		ft/m									
C.		ft/m									
D.		ft/m									
		ft/m									
		ft/m									
		ft/m									

Comments

A. pH meter may be acting up again. All other meters are working well.

B.

C.

D.

Lat. N 33° 23' 13.65

Long. W 117° 19' 25.39

Map drawing marked on airphoto YES NO

Insects Collected YES NO

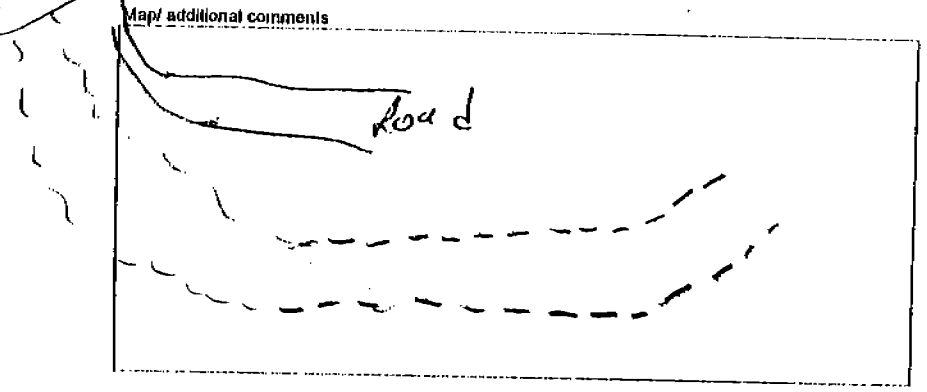
GPS Reading YES NO

0469892e

3694250n

elevation 257

Map/ additional comments



RC1

Riffle Sample Locations

Length 20 m
Width 2 m

INSECT COLLECTION DATA FORM

Date/Time 3-24-97 1043

Collector(s) MC

Stream Roblar Creek ↑ 200 yards at mouth

Sample Number RC1

County San Diego

Township _____ Range _____

0469842c
3694250n
elevation 257'

Weather sunny

Air/ Temp. 70's

Reach RC1

Comments

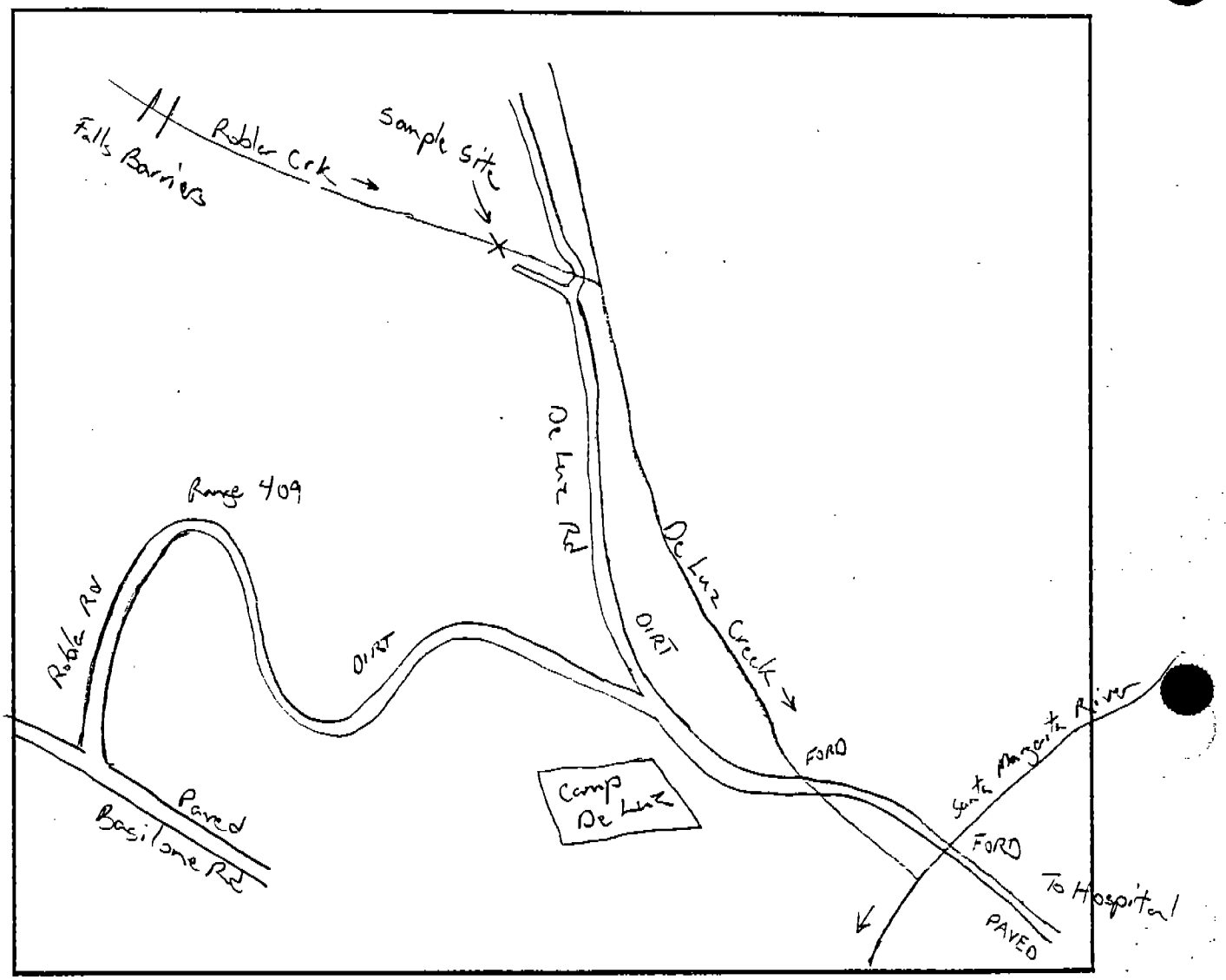
Mosquito fish present, about 2CFS

Hand Map of Stream location Date 3-24-97

Author of Map MC

Field Crew MC, BO, RK

3/4



RC-1

RC 1 Took Rabler Rd to De Luz Camp Rd to creek, but could have gone in behind hospital if you would have made it across Santa Margarita River Ford.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: Roblar Creek

Location: RC-1

Date:

Order: Family Genus Species	Sample site Tallies 1.1	1.2	1.3
Diptera			
Tipulidae	8	3	14
Simuliidae	3	9	12
Chironamidae	4	10	10
Chironamidae (All others)	Ø	14	24
Ceratopogonidae	2	2	1
Syrphidae	1	Ø	Ø
Ephydridae	12	3	18
Ephemeroptera			
Baetidae	29	43	67
Caenidae (Juvenile)	2	1	16
Odonata			
Coenagrionidae	11	Ø	Ø
Calopterygidae	Ø	3	Ø
Aeshnidae	1	Ø	2
Gomphidae	4	Ø	3
Plecoptera			
Perlodidae	Ø	2	3
Nemouridae	12	5	4
Tricoptera			
Hydropsychidae	5	4	24
Hydroptilidae	2	3	Ø
Rhyacophilidae	1	Ø	2
Megaloptera			
Corydalidae	1	1	1
Coleoptera			
Dryopidae (larvae)	3	2	1
" (Adults)	1	5	2
Elmidae	2	Ø	1
Dytiscidae	3	2	4
Hydrophilidae	4	6	8
Hemiptera			
Belostomadidae	Ø	1	Ø
Corixidae	1	Ø	Ø
	111	119	217