



Subregional Long-Term Wastewater Project

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# AQUATIC LIFE SURVEY RESULTS

## SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

*Prepared for*

City of Santa Rosa  
and  
U.S. Army Corps of Engineers

April 1996

*Prepared by*

Merritt Smith Consulting  
Environmental Science and Communication  
3675 Mt. Diablo Blvd. #120 Lafayette, CA 94549

*For*

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**HARLAND BARTHOLOMEW & ASSOCIATES, INC.**

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## AUTHOR

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This report was prepared by Michael H. Fawcett, Ph.D.

# 1.0 PURPOSE

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The purpose of conducting the aquatic life surveys is to characterize existing fish, reptile, amphibian, and invertebrate fauna residing in streams or other aquatic systems that may be affected by components of various project alternatives, primarily storage and irrigation scenarios. The objective of the surveys is to provide qualitative information that can be used as the basis for preparing settings and impacts sections of the EIR/EIS.

## 1.1 ORGANIZATION OF THIS TECHNICAL REPORT

Section 2.0 explains the survey approach and the methods employed. The results of the aquatic life surveys conducted as part of this task are presented in Section 3.0, and are organized by project region: West County, Sebastopol, or South County.

## 2.0 METHODOLOGY

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The aquatic life surveys consisted of assessing and describing aquatic habitat while searching and sampling for aquatic life. Aquatic habitat and aquatic life are intricately linked. Emergent plants are important both as part of the aquatic food chain and as physical habitat, and provide shade, shelter, and an oxygen source. Some organisms, through their role as natural predators or competitors, are also important components of the habitat. For example, abundant predatory fish, especially introduced species, may make habitat unsuitable for California freshwater shrimp (*Syncaris pacifica*), as well as other species. Bullfrogs (*Rana catesbiana*), another predator, are a deleterious component of habitat for native frogs. Carp (*Cyprinus carpio*), through their feeding behavior, may have negative effects on water quality and the stability of bottom sediments, which affect the suitability of habitat for many other species.

Both the aquatic habitat and aquatic life surveys emphasize sensitive species known or likely to occur in the project region, as shown in Table 1. The habitat requirements of the species in Table 1 are summarized in the *Aquatic Habitat Survey Results Technical Report* (MSC 1996). The types of habitat required by the sensitive species listed above are likely to be encountered in the project area, and also serve to define habitat characteristics required by many other native, but non-sensitive species of fish, reptiles, amphibians, and invertebrates. Thus, assessment of habitat suitability for sensitive species results in the assessment of habitat suitability for many other ecologically important, but non-sensitive native species. In addition, searching and sampling for sensitive species simultaneously results in the collection of many observations on the distribution and abundance of non-sensitive species.

Sampling of aquatic animals (by means of dipnets and seines) was conducted in summer 1995, although many observations and sightings were recorded during the initial round of habitat surveys, which began a year earlier. The streams sampled are shown in Figure 1. In all areas surveyed, the streams are small enough that a dipnet or a small seine are adequate for capturing aquatic invertebrates and vertebrates. All of the types of aquatic habitat found at each survey site were examined and sampled, but with particular emphasis on the least degraded areas, as discussed in the *Aquatic Habitat Survey Results Technical Report* (MSC 1996). All vertebrates captured were examined and identified at the capture site, then released at the same site. Nearly all invertebrates captured were also examined, then released, although in some cases voucher specimens were collected for microscopic examination and identification at the laboratory.

Table 1.

Project Area Sensitive Species

Sensitive (Special Status) Species	Status	
	State <sup>a</sup>	Federal <sup>b</sup>
Steelhead trout ( <i>Oncorhynchus mykiss</i> ) <sup>c</sup>	--	--
Coho salmon ( <i>Oncorhynchus kisutch</i> )	SCT	FPT
Hardhead ( <i>Mylopharodon conocephalus</i> )	SSC	--
Russian River tule perch ( <i>Hysterocarpus traskii pom</i> )	SSC	--
Tidewater goby ( <i>Eucyclogobius newberry</i> )	SSC	FE
Sacramento splittail ( <i>Pogonichthys macrolepidotus</i> )	SSC	FPT
River lamprey ( <i>Lampetra ayresii</i> )	SSC	--
Navarro roach ( <i>Lavinia symmetricus navarroensis</i> )	SSC	--
California red-legged frog ( <i>Rana aurora draytoni</i> )	SSC	FPE
Foothill yellow-legged frog ( <i>Rana boylei</i> )	SSC	--
California tiger salamander ( <i>Ambystoma tigrinum californiensis</i> )	SSC	FC
Northwestern pond turtle ( <i>Clemmys marmorata marmorata</i> )	SSC	--
California freshwater shrimp ( <i>Syncaris pacifica</i> )	SE	FE

Source: Harland Bartholomew & Associates 1996

<sup>a</sup> State status: State status data taken from CDFG documents, Endangered and Threatened Animals of California and Listing Dates (Revised April 1996) and Special Animals (Revised August 1994).

SE = State-listed Endangered, ST = State-listed Threatened, CR = State-listed Rare, SCE = State Candidate Endangered, SCT = State Candidate Threatened, SSC = Species of Special Concern, CFP = State-listed Fully Protected

<sup>b</sup> Federal Status: Federal status and probable distribution in Marin and Sonoma counties determined by correspondence with Laurie Simons-USFWS, 9 February 1994.

FE = Federal-listed Endangered, FT = Federal-listed Threatened, FPE = Proposed Endangered, FPT = Proposed Threatened, FC = Candidate for listing under the Endangered Species Act

Note: In a series of federal register notices (50 CFR Part 17, Volume 61, Number 40, 7457-74563 and 7595-7613, February 28, 1996), the USFWS reclassified 96 candidate taxa of plants and animals. The USFWS no longer recognizes a federal candidate category 2 status. There are now 182 plant and 89 animal taxa on a single candidate species list. These taxa are considered by the USFWS as candidates for possible addition to the List of Endangered and Threatened Plants and Animals. As a consequence, the status of many taxa originally included in the analysis has changed, requiring that many taxa be removed from the list of species being considered in this EIR/EIS analysis. See Biological Resources Technical Memorandum, Volume II (HBA 1996) for further information.

<sup>c</sup> While the steelhead has no current state or federal status, both DFG and NMFS are investigating its listing.

## 3.0 RESULTS

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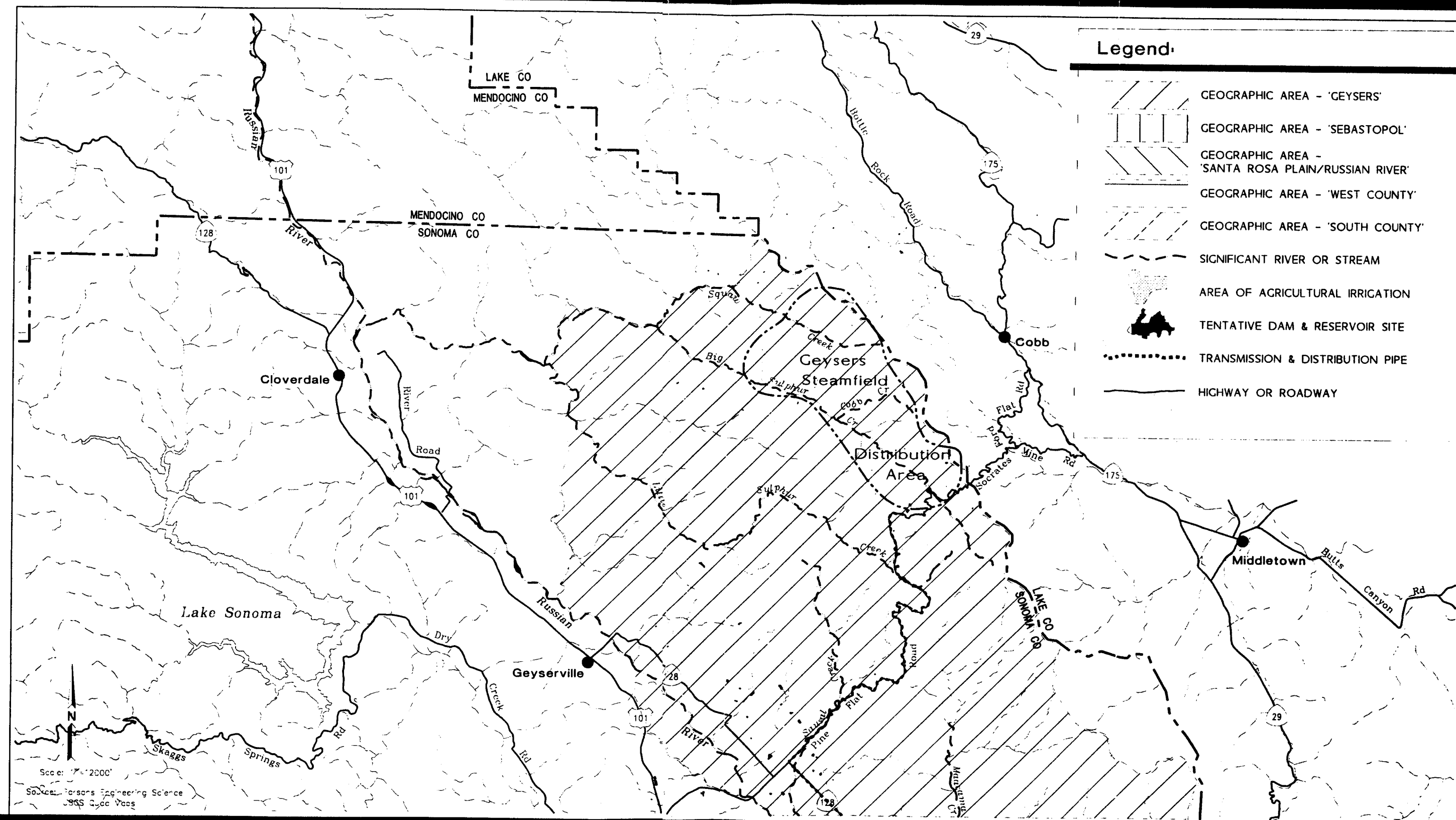
Survey results are summarized for aquatic vertebrates and aquatic invertebrates as follows:

### 3.1 AQUATIC VERTEBRATES

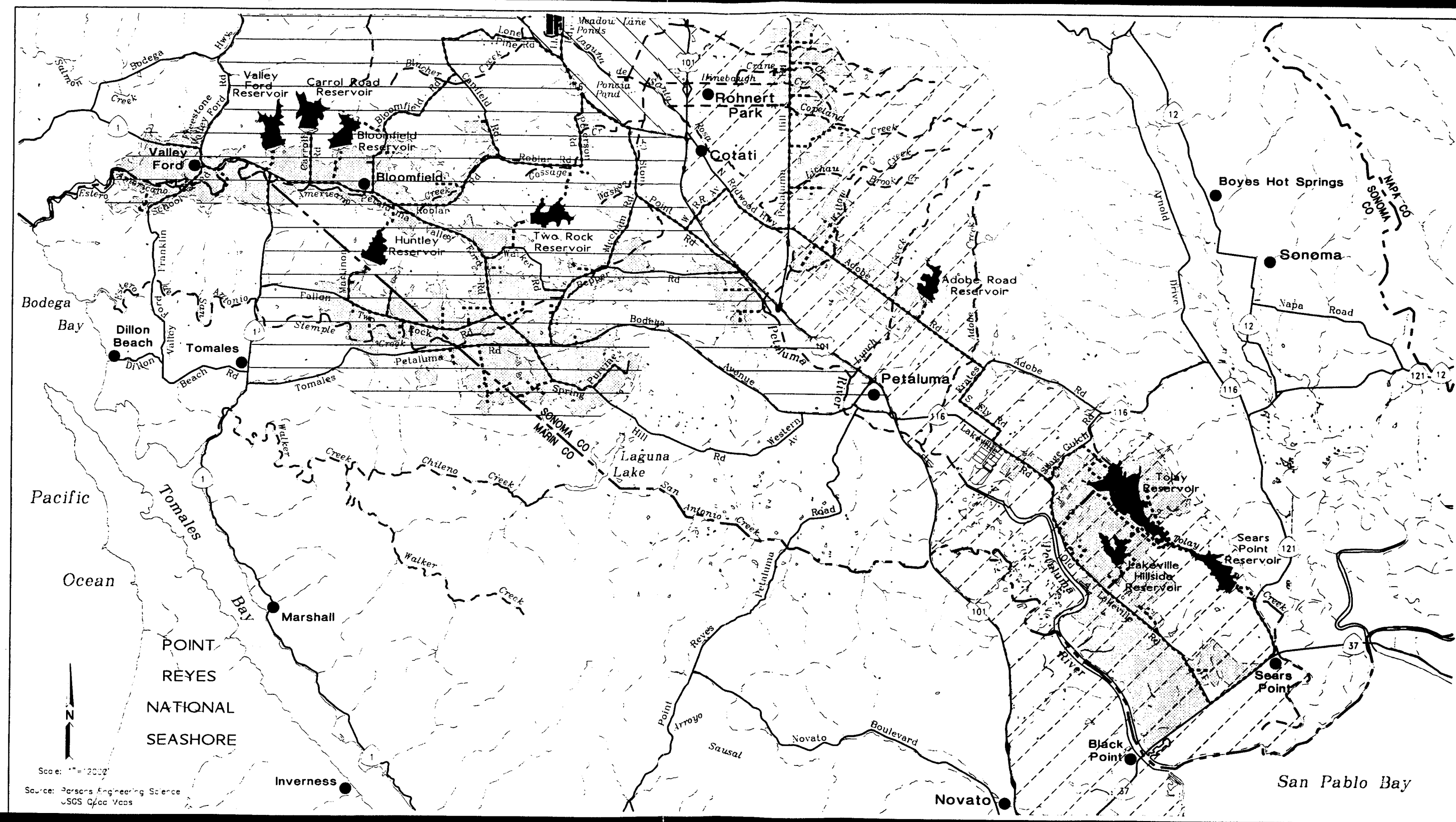
Table 2 (West County), Table 3 (Sebastopol), and Table 4 (South County) summarize the observations made during the aquatic life surveys. This information is best considered in the context of the habitat descriptions presented in the *Aquatic Habitat Survey Results Technical Report* (MSC 1996). The habitat assessment will be used to determine potential project impacts in preparing the EIR/EIS. Major habitat characteristics such as plant life, stream gradient, and substrate type are readily observable and stationary, unlike the animal species of interest; which may be undetected even when present. Many of the animal species of interest are relatively rare at any site, and often successfully avoid being detected by humans or other potential predators. Combining information about the habitat available at a site with the habitat requirements and known distribution of species of interest within the watershed or general area, allows prediction of what species may occur at the site, whether or not any individuals are seen during the surveys. Thus the columns labeled "Sensitive species present or likely" in Tables 2, 3, and 4 are probably of more value in considering potential project effects than is the column labeled "Sensitive species observed during surveys". The columns listing sensitive species in those tables include invertebrates.

A review of the EIR/EIS and other technical reports (HBA 1996a, 1996b, 1996c) developed in support of the EIR/EIS may be necessary to supplement this report. Those documents reflect the results of additional field work (e.g., special status species observations) that are useful supplements to this report.









HARLAND BARTHOLOMEW and ASSOCIATES, INC.

A UNIT OF PARSONS INFRASTRUCTURE AND TECHNOLOGY GROUP INC.



*Santa Rosa*

Subregional Long-Term  
Wastewater Project

WATERWAYS SURVEYED  
FOR AQUATIC LIFE

Figure 1c

### 3.2 AQUATIC INVERTEBRATES

Aquatic invertebrates were sampled at the nine proposed reservoir sites during May 1995. The West County reservoir sites were surveyed again in August 1995. The kinds of invertebrates which occur in a stream are related to the quality of the habitat, often in a more direct and recognizable way than are vertebrates. Typical coldwater streams contain an assemblage of invertebrates dominated by larvae of stoneflies, mayflies, and caddisflies. These insect groups are important as fish prey and are indicative of a healthy, undisturbed stream. Surveys of aquatic invertebrates focus on the least degraded sections of each stream in order to determine how many of these indicator species still occur there. These data provide another way of ranking habitat quality at different sites.

Over forty kinds (taxa) of aquatic invertebrates were identified from each of the nine proposed reservoir sites. Most of these could be identified to the genus level. A few were classified only to family. The detailed results of surveys at each reservoir site are presented in Appendix 1. Distinct portions of the aquatic habitat, such as headwater tributaries, are tabulated separately. A summary table (Table 4) provides the total number of taxa, and the number of stonefly, mayfly, and caddisfly (S-M-C) genera found at each site.

The five west county reservoir sites were revisited in August 1995, and the results are included in the appendix tables and in Table 5. In general the stream sections were dry or nearly dry when visited in August, so the typical stream insects (mayflies, stoneflies, and caddisflies) were not as well represented, as shown in Table 4. The sole exception was Tributary 2 at the Two Rock site, which was nearly dry but still flowing when visited on August 21. Most of the habitats that were still wet in August were isolated pools, with little or no surface flow in the stream channels. The total number of taxa found in the August surveys was similar to numbers found in May, but the kinds of invertebrates found in August were typically found in ponds. Several kinds of invertebrates, such as mosquito and phantom midge larvae and snails were found only in the August surveys.

The Tomales isopod (*Caecidotea tomalensis*) was found at the Two Rock site in both May and August, and was found at the Carroll and Valley Ford sites in August only. Although the species has no current federal or state status, *C. tomalensis* is thought to be the only eyed asellid isopod found in California. Specimens from these collections have been confirmed by a specialist (L. Serpa, pers. comm.).

The California freshwater shrimp, *Syncaris pacifica* (a federally listed endangered species) was found in the middle reach of Green Valley Creek during the salmonid juvenile density surveys in August. Four individuals were inadvertently collected in fish seines. All were released unharmed. *S. pacifica* has been collected previously in Green Valley Creek, but most earlier records have been farther downstream (L. Serpa, pers. comm.). *S. pacifica* is also known from a downstream section of Stemple Creek (near Highway 1).

TABLE 2.

Aquatic Life: West County Streams

Stream Name	Drainage	Project Component	Permanence <sup>a</sup>	Level of Disturbance <sup>b</sup>	Habitat Types Present <sup>c</sup>	Sensitive SPP Present or Likely <sup>d</sup>	Sensitive SPP Observed During Survey <sup>d</sup>	Sensitive SPP Present or Likely Downstream <sup>d</sup>	Other Vertebrates Observed During Survey <sup>e</sup>
Unnamed	Americano	Valley Ford Reservoir	S	2	WW-A, WW-B, Pond	CA red-legged frog, Northwestern pond turtle,	Northwestern pond turtle, CA red-legged frog,	Tidewater goby, CA red-legged frog, Northwestern pond turtle,	Three-spined stickleback, Pacific tree frog, Bullfrog, CA newt
Unnamed	Americano	Carroll Reservoir	P	2	WW-A, WW-B, CW-B, Pond	CA red-legged frog, Northwestern pond turtle, Steelhead trout	Steelhead trout	Tidewater goby, CA red-legged frog, Northwestern pond turtle,	CA newt, Three-spined stickleback, Centrarchid, Pacific tree frog, Bullfrog
Unnamed	Americano	Bloomfield Reservoir	S	3	WW-A, WW-B, Pond	CA red-legged frog, Northwestern pond turtle	None	Tidewater goby, CA red-legged frog, Northwestern pond turtle,	Bullfrog, Western toad, Three-spined stickleback, Pacific tree frog
Americano Creek	Americano	West County Irrigation	S	3	WW-A, WW-B	CA red-legged frog, Northwestern pond turtle,	None	Tidewater goby,	Bullfrog
Unnamed	Stemple	Huntley Reservoir	S	3	WW-A, WW-B, Pond	CA red-legged frog, Northwestern pond turtle	Northwestern pond turtle, CA red-legged frog	Tidewater goby, CA freshwater shrimp, Northwestern pond turtle, CA red-legged frog,	Pacific tree frog, Bullfrog, Western terrestrial garter snake, Three-spined stickleback
Unnamed	Stemple	Two Rock Reservoir	P	3	WW-A, WW-B, CW-B, Pond	CA red-legged frog, Northwestern pond turtle,	Northwestern pond turtle,	Tidewater goby, CA freshwater shrimp, Northwestern pond turtle, CA red-legged frog,	Bullfrog, Centrarchid, CA newt, Catfish, Rough-skinned newt
Stemple Creek	Stemple	West County Irrigation	P	3	WW-A, WW-B	CA red-legged frog, CA freshwater shrimp	None	Tidewater goby, CA freshwater shrimp,	None

TABLE 2.

Aquatic Life: West County Streams

Stream Name	Drainage	Project Component	Permanence <sup>a</sup>	Level of Disturbance <sup>b</sup>	Habitat Types Present <sup>c</sup>	Sensitive SPP Present or Likely <sup>d</sup>	Sensitive SPP Observed During Survey <sup>d</sup>	Sensitive SPP Present or Likely Downstream <sup>d</sup>	Other Vertebrates Observed During Survey <sup>e</sup>
Blucher Creek	Laguna-Russian River	West County Irrigation	P	3	WW-A, CW-B	CA red-legged frog, CA freshwater shrimp, Northwestern pond turtle, Navarro roach	None	Coho salmon, Steelhead trout, CA red-legged frog, Northwestern pond turtle, Hardhead, Russian River tule perch, Navarro roach, River lamprey	Three-spined stickleback, Mosquitofish
Gossage Creek	Laguna-Russian River	West County Irrigation	P	3	WW-A, WW-B	CA red-legged frog, Northwestern pond turtle, Navarro roach	Navarro roach	Steelhead trout, Coho salmon, Russian River tule perch, CA red-legged frog, Northwestern pond turtle, Hardhead, Navarro roach, River lamprey	Bullfrog, Centrarchid, Mosquitofish, Three-spined stickleback

Source: Merritt Smith Consulting, 1996

<sup>a</sup> Permanence: P = Perennial; continuous surface flow through summer, or subsurface flow sufficient to maintain cool water in intermittent pools during dry season. S = Seasonal; dries completely or nearly so; warm pools or stock ponds may persist, but no cool pools in dry season.

<sup>b</sup> Level of Disturbance: 3-Heavy to moderate throughout. 2-Most of stream disturbed, but patches of natural habitat remain. 1 Low, near natural conditions.

<sup>c</sup> Habitat Types: WW-A = Warmwater-A, WW-B = Warmwater-B, CW-B = Coolwater-B (see Aquatic Habitat Survey Results technical report (MSC 1996) for definitions).

<sup>d</sup> Sensitive Species: Coho salmon (*Oncorhynchus kisutch*), Steelhead trout (*Oncorhynchus mykiss*), Hardhead (*Mylopharodon conocephalus*), Russian River tule perch (*Hysterothorax traskii*), Sacramento splittail (*Pogonichthys macrolepidotus*), Tidewater goby (*Eucyclogobius newberryi*), California tiger salamander (*Ambystoma tigrinum californiense*), CA red-legged frog (*Rana aurora draytoni*), Foothill yellow-legged frog (*Rana boylei*), Northwestern pond turtle (*Clemmys marmorata marmorata*), CA freshwater shrimp (*Syncaris pacifica*), River lamprey (*Lampetra ayresii*), Navarro roach (*Lavinia symmetricus navarroensis*)

<sup>e</sup> Other vertebrate species: Bullfrog (*Rana catesbeiana*), Pacific treefrog (*Hyla regilla*), California newt (*Taricha tarosia*), Rough-skinned newt (*Taricha granulosa*), Threespine stickleback (*Gasterosteus aculeatus*), Western toad (*Bufo boreas*), Centrarchid: (bass, bluegill, black crappies), Mosquitofish (*Gambusia affinis*), Western terrestrial garter snake (*Thamnophis elegans*), Catfish (black or brown bullhead).

TABLE 3.

Aquatic Life: Sebastopol Streams

Stream Name	Drainage	Project Component	Permanence <sup>a</sup>	Level of Disturbance <sup>b</sup>	Habitat Types Present <sup>c</sup>	Sensitive SPP Present or Likely <sup>d</sup>	Sensitive SPP Observed During Survey <sup>d</sup>	Sensitive SPP Present or Likely Downstream <sup>d</sup>	Other Vertebrates Observed During Survey <sup>e</sup>
Green Valley Creek	Russian River	Sebastopol Irrigation	P	2	WW-A, CW-B	CA red-legged frog, Steelhead trout, Coho salmon, CA freshwater shrimp, Northwestern pond turtle, Navarro roach, Russian River tule perch	Steelhead trout, Coho salmon, CA freshwater shrimp, Navarro roach	Coho salmon, Steelhead trout, CA red-legged frog, Northwestern pond turtle, Hardhead, Russian River tule perch, Navarro roach, River lamprey	Centrarchid, Bullfrog
Atascadero Creek	Russian River	Sebastopol Irrigation	P	2	WW-A, CW-B	Steelhead trout, Coho salmon, CA red-legged frog, CA freshwater shrimp, Northwestern pond turtle, Russian River tule perch, Navarro roach	Navarro roach	Coho salmon, Steelhead trout, CA red-legged frog, Northwestern pond turtle, Hardhead, Russian River tule perch, Navarro roach, River lamprey	None

Source: Merritt Smith Consulting, 1996

<sup>a</sup> Permanence: P = Perennial; continuous surface flow through summer, or subsurface flow sufficient to maintain cool water in intermittent pools during dry season. S = Seasonal; dries completely or nearly so; warm pools or stock ponds may persist, but no cool pools in dry season.

<sup>b</sup> Level of Disturbance: 3-Heavy to moderate throughout. 2-Most of stream disturbed, but patches of natural habitat remain. 1 Low, near natural conditions.

<sup>c</sup> Habitat Types: WW-A = Warmwater-A, WW-B = Warmwater-B, CW-B = Coolwater-B (Aquatic Habitat Survey Resultstechnical report (MSC 1996) for definitions).

<sup>d</sup> Sensitive Species: Coho salmon (*Oncorhynchus kisutch*), Steelhead trout (*Oncorhynchus mykiss*), Hardhead (*Mylopharodon conocephalus*), Russian River tule perch (*Hysteroecarpus traskii pomoi*), Sacramento splittail (*Pogonichthys macrolepidotus*), Tidewater goby (*Eucyclogobius newberryi*), California tiger salamander (*Ambystoma tigrinumcaliforniense*), CA red-legged Frog (*Rana aurora draytoni*), Foothill yellow-legged frog (*Rana boylei*), Northwestern pond turtle (*Clemmys marmorata marmorata*), CA freshwater shrimp (*Syncaris pacifica*), River lamprey (*Lampetra ayresii*), Navarro roach (*Lavinia symmetricus navarroensis*)

<sup>e</sup> Other vertebrate species: Bullfrog (*Rana catesbiana*), Pacific treefrog (*Hyla regilla*), California newt (*Taricha tarosa*), Rough-skinned newt (*Taricha granulosa*), Threespine stickleback (*Gasterosteus aculeatus*), Western toad (*Bufo boreas*), Centrarchid: (bass, bluegill, black crappies), Mosquitofish (*Gambusia affinis*), Western terrestrial garter snake (*Thamnophis elegans*), Catfish (black or brown bullhead).

**Table 4.**

**Aquatic Life: South County Streams**

<b>Stream Name</b>	<b>Drainage</b>	<b>Project Component</b>	<b>Perma-nence<sup>a</sup></b>	<b>Level of Distur-bance<sup>b</sup></b>	<b>Habitat Types Present<sup>c</sup></b>	<b>Sensitive SPP Present or Likely<sup>d</sup></b>	<b>Sensitive SPP Observed During Survey<sup>d</sup></b>	<b>Sensitive SPP Present or Likely Downstream<sup>d</sup></b>	<b>Other Vertebrates Observed During Survey<sup>e</sup></b>
Lichau Creek	Petaluma River	South County Irrigation	S	3	WW-B	None	None	Northwestern pond turtle, Sacramento splittail, Steelhead trout, River lamprey	None
Willowbrook Creek	Petaluma River	South County Irrigation	S	3	WW-B	None	None	Northwestern pond turtle, Sacramento splittail, Steelhead trout, River lamprey	None
Petaluma River	Petaluma River	South County Irrigation	P	3	WW-A	Northwestern pond turtle, CA red-legged frog	None	Sacramento splittail, Steelhead trout, River lamprey	Mosquitofish
Adobe Creek	Petaluma River	South County Irrigation	P	2	WW-A, CW-B	CA red-legged frog, Northwestern pond turtle, Steelhead trout, Yellow-legged frog	None	Sacramento splittail, Steelhead trout, River lamprey	None
Unnamed	Petaluma River	Lakeville-Hillside Reservoir	S	3	WW-B	CA red-legged frog, Northwestern pond turtle	None	Sacramento splittail, Steelhead trout, River lamprey	Pacific tree frog



Table 4.

Aquatic Life: South County Streams

Stream Name	Drainage	Project Component	Perma-nence <sup>a</sup>	Level of Distur-bance <sup>b</sup>	Habitat Types Present <sup>c</sup>	Sensitive SPP Present or Likely <sup>d</sup>	Sensitive SPP Observed During Survey <sup>d</sup>	Sensitive SPP Present or Likely Downstream <sup>d</sup>	Other Vertebrates Observed During Survey <sup>e</sup>
Unnamed	Petaluma River	Adobe Reservoir	S	2	WW-B	CA red-legged frog, Northwestern pond turtle	None	CA red-legged frog, Northwestern pond.turtle, Steelhead trout, River lamprey, Sacramento splittail	Pacific tree frog
Tolay Creek	Sonoma Creek	Tolay Reservoir	S	3	WW-A, WW-B	CA red-legged frog, Northwestern pond turtle	None	Steelhead trout, River lamprey	Bullfrog, Pacific tree frog, Western terrestrial garter snake
Tolay Creek	Sonoma Creek	Sears Point Reservoir	S	2	WW-A, WW-B	CA red-legged frog, Northwestern pond turtle	None	Steelhead trout, River lamprey	Bullfrog, Pacific tree frog, Western terrestrial garter snake
Crane Creek	Laguna-Russian River	South County Irrigation	P	2	WW-A, WW-B, CW-B	CA red-legged frog, Northwestern pond turtle	None	CA red-legged frog, Northwestern pond turtle, Coho salmon, Steelhead trout, Hardhead, Russian River tule perch, River lamprey, Navarro roach	None

Table 4.

Aquatic Life: South County Streams

Stream Name	Drainage	Project Component	Permanence <sup>a</sup>	Level of Disturbance <sup>b</sup>	Habitat Types Present <sup>c</sup>	Sensitive SPP Present or Likely <sup>d</sup>	Sensitive SPP Observed During Survey <sup>d</sup>	Sensitive SPP Present or Likely Downstream <sup>d</sup>	Other Vertebrates Observed During Survey <sup>e</sup>
Copeland Creek	Laguna-Russian River	South County Irrigation	P	2	WW-A, WW-B, CW-B	CA red-legged frog, Northwestern pond turtle, CA freshwater shrimp	None	CA red-legged frog, Northwestern pond turtle, Coho salmon, Steelhead trout, Hardhead, Russian River tule perch, River lamprey, Navarro roach	None

Source: Merritt Smith Consulting, 1996

<sup>a</sup> Permanence: P = Perennial; continuous surface flow through summer, or subsurface flow sufficient to maintain cool water in intermittent pools during dry season. S = Seasonal; dries completely or nearly so; warm pools or stock ponds may persist, but no cool pools in dry season.

<sup>b</sup> Level of Disturbance: 3-Heavy to moderate throughout. 2-Most of stream disturbed, but patches of natural habitat remain. 1 Low, near natural conditions.

<sup>c</sup> Habitat Types: WW-A = Warmwater-A, WW-B = Warmwater-B, CW-B = Coolwater-B (see *Aquatic Habitat Survey Results* technical report (MSC 1996) for definitions).

<sup>d</sup> Sensitive Species: Coho salmon (*Oncorhynchus kisutch*), Steelhead trout (*Oncorhynchus mykiss*), Hardhead (*Mylopharodon conocephalus*), Russian River tule perch (*Hysterocarpus traskii*), Sacramento splittail (*Pogonichthys macrolepidotus*), Tidewater goby (*Eucyclogobius newberryi*), California tiger salamander (*Ambystoma tigrinum californiense*), CA red-legged Frog (*Rana aurora draytoni*), Foothill yellow-legged frog (*Rana boylei*), Northwestern pond turtle (*Clemmys marmorata marmorata*), CA freshwater shrimp (*Syncaris pacifica*), River lamprey (*Lampetra ayresii*), Navarro roach (*Lavinia symmetricus navarroensis*)

<sup>e</sup> Other vertebrate species: Bullfrog (*Rana catesbiana*), Pacific treefrog (*Hyla regilla*), California newt (*Taricha tarosa*), Rough-skinned newt (*Taricha granulosa*), Threespine stickleback (*Gasterosteus aculeatus*), Western toad (*Bufo boreas*), Centrarchid: (bass, bluegill, black crappies), Mosquitofish (*Gambusia affinis*), Western terrestrial garter snake (*Thamnophis elegans*), Catfish (black or brown bullhead).

**Table 5.**

Summary of Aquatic Invertebrates from Reservoir Sites - May and August 1995

Site	Total Taxa		Stonefly Genera		Mayfly Genera		Caddisfly Genera		S-M-C Total	
	May	Aug	May	Aug	May	Aug	May	Aug	May	Aug
<b>West County: Stemple</b>										
Two Rock	28	32	3	2	5	2	5	5	13	9
Huntley	13	14	0	0	2	1	2	0	4	1
<b>West County: Americano</b>										
Bloomfield	16	15	1	1	2	1	0	0	3	2
Carroll	17	15	1	1	2	2	1	0	4	3
Valley Ford	16	11	0	1	3	2	0	0	3	3
<b>South County</b>										
Tolay	11	ns <sup>a</sup>	0	ns	0	ns	0	ns	0	ns
Lakeville	7	ns	0	ns	2	ns	0	ns	2	ns
Adobe	17	ns	0	ns	2	ns	1	ns	3	ns
Sears Point	19	ns	2	ns	5	ns	1	ns	8	ns

Source: Merritt Smith Consulting, 1996

<sup>a</sup> ns = not resurveyed in August 1995

## 4.0 REFERENCES

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## 5.0 APPENDICES

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**Aquatic Invertebrates from South County Reservoir Sites, May 1995.**

	Tolay		Lakeville	Adobe	Sears Point	
	23-May-95		23-May-95	24-May-95	25-May-95	
	N. Trib.	main stream	main stream	main stream	E. Trib.	main stream
<b>Annelida</b> Oligochaeta (aquatic earthworms) Naididae						
<b>Hirudinea (leeches)</b> <i>Erpobdella</i> sp. <i>Placobdella</i> sp.					X	
<b>Arthropoda</b> Crustacea (crustaceans) Conchostraca (clam shrimps) <i>Cyzicus californicus</i>		X				
Amphipoda (scuds) <i>Crangonyx</i> sp. <i>Hyalella azteca</i> <i>Anisogammarus</i> sp.	X	X		X	X	X
Isopoda (aquatic sowbugs) <i>Caecidotea (=Asellus) tomalensis</i>						
Cladocera (water fleas) <i>Simocephalus serrulatus</i>				X		
Decapoda (crayfish, shrimp) <i>Pacifastacus</i> sp. <i>Procambarus clarki</i> <i>Syncaris pacifica</i>						
<b>Insecta (insects)</b> Plecoptera (stoneflies) <i>Malenka</i> sp. <i>Rickera sorpta</i> <i>Calineuria californica</i> <i>Isoperla</i> sp.					X	X
Ephemeroptera (mayflies) <i>Baetis</i> sp. <i>Callibaetis</i> sp. <i>Ironodes californicus</i> <i>Paraleptophlebia</i> sp. <i>Siphonurus</i> sp.			X	X	X	X
Odonata Anisoptera (dragonflies) <i>Anax</i> sp. <i>Cordulia</i> sp. <i>Cordulegaster dorsalis</i> <i>Pachydiplax</i> sp. <i>Tametrum</i> sp.		X		X		
Zygoptera (damselflies) <i>Archilestes grandis</i> <i>Argia</i> sp. <i>Enallagma</i> sp. <i>Ischnura</i> sp. <i>Lestes</i> sp.		X		X	X	X
Hemiptera (true bugs) Gerridae (water striders) <i>Gerris</i> sp.	X	X	X	X	X	X
Belostomatidae (toe biters) <i>Belostoma</i> sp.						
Corixidae (water boatmen) <i>Corisella</i> sp.	X	X		X		X
Notonectidae (backswimmers) <i>Notonecta</i> sp.			X			
Nepidae (water scorpions) <i>Ranatra</i> sp.						
Megaloptera (hellgrammites) <i>Protochauliodes</i> sp. <i>Sialis</i> sp.				X		

**Aquatic Invertebrates from South County Reservoir Sites, May 1995.**

	Tolay		Lakeville	Adobe	Sears Point	
	23-May-95		23-May-95	24-May-95	25-May-95	
	N. Trib.	main stream	main stream	main stream	E. Trib.	main stream
Trichoptera (caddisflies)						
<i>Homophylax</i> sp.						
<i>Hydropsyche</i> sp.						
<i>Lepidostoma</i> sp.						
<i>Gumaga</i> sp.						
<i>Pseudostenophylax edwardsi</i>						
<i>Parapsyche</i> sp.				X	X	
<i>Polycentropus</i> sp.						
<i>Rhyacophila</i> sp.						
<i>Wormaldia</i> sp.						
Coleoptera (beetles)						
Dytiscidae (predaceous diving beetles)						
dytiscid larvae and adults			X	X	X	X
Gyrinidae (whirligig beetles)						
gyrinid adults						
Psephenidae (water pennies)						
<i>Eubrianax edwardsi</i>						
Hydrophilidae (water scavenger beetles)						
hydrophilid larvae and adults	X			X	X	X
Diptera (true flies)						
Tipulidae (crane flies)						
<i>Hexatoma</i> sp.						
<i>Pedicia</i> sp.						
<i>Tipula</i> sp.						
Chaoboridae (phantom midges)						
<i>Chaoborus trivittatus</i>						
Culicidae (mosquitos)						
<i>Anopheles occidentalis</i>						
<i>Culiseta incidens</i>						
Dixidae (dixa midges)						
<i>Dixella</i> (= <i>Paradixa</i> ) sp.				X		
Simuliidae (black flies)						
<i>Simulium</i> sp. larvae and pupae			X	X	X	X
Chironomidae (midges)						
chironomid larvae		X		X		
Sciomyzidae (marsh flies)						
sciomyzid larvae						
Mollusca (molluscs)						
Gastropoda (snails)						
<i>Helisoma</i> sp.		X				
<i>Radix auricularia</i>						
<i>Stagnicola</i> (= <i>Lymnaea</i> ) sp.		X				
<i>Physella</i> (= <i>Physa</i> ) sp.	X		X	X	X	

NUMBER OF TAXA

4      9      7      17      16      12

Aquatic Invertebrates from West County Reservoir Sites in Americano Creek Drainage, May and August 1995.

	Bloomfield			Carroll			Valley Ford			Bloomfield	Carroll	Valley Ford
	17-May-95			19-May-95			26-May-95			22-Aug-95	23-Aug-95	23-Aug-95
	main stream	E. Trib.	ponds	E. Trib.	W. Trib.	main stream	W. Trib.	E. Trib.	main stream	main stream	main stream	E. Trib.
Trichoptera (caddisflies)												
<i>Homophylax</i> sp.												
<i>Hydropsyche</i> sp.												
<i>Lepidostoma</i> sp.												
<i>Gumaga</i> sp.												
<i>Pseudostenophylax edwardsi</i>												
<i>Parapsyche</i> sp.					X							
<i>Polycentropus</i> sp.												
<i>Rhyacophila</i> sp.												
<i>Wormaldia</i> sp.												
Coleoptera (beetles)												
Dytiscidae (predaceous diving beetles)												
dytiscid larvae and adults	X	X		X		X		X	X	X	X	X
Gyrinidae (whirligig beetles)												
gyrinid adults												
Psephenidae (water pennies)												
<i>Eubrianax edwardsi</i>												
Hydrophilidae (water scavenger beetles)												
hydrophilid larvae and adults							X				X	
Diptera (true flies)												
Tipulidae (crane flies)												
<i>Hexatoma</i> sp.												
<i>Pedicia</i> sp.				X								
<i>Tipula</i> sp.												
Chaoboridae (phantom midges)												
<i>Chaoborus trivittatus</i>												X
Culicidae (mosquitos)												
<i>Anopheles occidentalis</i>												
<i>Culiseta incidens</i>												
Dixidae (dixa midges)												
<i>Dixella</i> (=Paradixa) sp.												
Simuliidae (blackflies)												
<i>Simulium</i> sp. larvae and pupae	X			X	X	X		X		X	X	
Chironomidae (midges)												
chironomid larvae	X	X		X		X	X		X			
Sciomyzidae (marsh flies)												
sciomyzid larvae				X								
Mollusca (molluscs)												
Gastropoda (snails)												
<i>Helisoma</i> sp.										X		
<i>Radix auricularia</i>										X		
<i>Stagnicola</i> (=Lymnaea) sp.										X		
<i>Physella</i> (=Physa) sp.	X						X	X		X	X	

NUMBER OF TAXA

11 5 5 11 9 10 13 10 5 15 15 11



**Aquatic Invertebrates from West County Reservoir Sites in Americano Creek Drainage, May and August 1995.**

	Bloomfield			Carroll			Valley Ford			Bloomfield	Carroll	Valley Ford
	17-May-95			19-May-95			26-May-95			22-Aug-95	23-Aug-95	23-Aug-95
	main stream	E. Trib.	ponds	E. Trib.	W. Trib.	main stream	W. Trib.	E. Trib.	main stream	main stream	main stream	E. Trib.
Annelida												
Oligochaeta (aquatic earthworms)												
Naididae				X			X					
Hirudinea (leeches)												
<i>Erpobdella</i> sp.	X			X				X		X		
<i>Placobdella</i> sp.						X						
Arthropoda												
Crustacea (crustaceans)												
Conchostraca (clam shrimps)												
<i>Cyzicus californicus</i>												
Amphipoda (scuds)												
<i>Crangonyx</i> sp.												
<i>Hyalella azteca</i>	X				X	X	X	X	X	X	X	X
<i>Anisogammarus</i> sp.	X											
Isopoda (aquatic sowbugs)												
<i>Caecidotea (=Asellus) tomalensis</i>											X	X
Cladocera (water fleas)												
<i>Simocephalus serrulatus</i>												
Decapoda (crayfish, shrimp)												
<i>Pacifastacus</i> sp.												
<i>Procambarus clarki</i>												
<i>Syncaris pacifica</i>												
Insecta (insects)												
Plecoptera (stoneflies)												
<i>Malenka</i> sp.		X		X	X	X					X	
<i>Rickera sorpta</i>												
<i>Calineuria californica</i>												
<i>Isoperla</i> sp.												
Ephemeroptera (mayflies)												
<i>Baetis</i> sp.	X	X		X	X	X	X					
<i>Callibaetis</i> sp.							X			X	X	X
<i>Ironodes californicus</i>												
<i>Paraleptophlebia</i> sp.	X			X	X	X	X				X	X
<i>Siphonurus</i> sp.												
Odonata												
Anisoptera (dragonflies)												
<i>Anax</i> sp.			X								X	
<i>Cordulia</i> sp.												X
<i>Cordulegaster dorsalis</i>												
<i>Pachydiplax</i> sp.												
<i>Tametrus</i> sp.										X		
Zygoptera (damselflies)												
<i>Archilestes grandis</i>												X
<i>Argia</i> sp.												
<i>Enallagma</i> sp.					X		X	X	X			
<i>Ischnura</i> sp.	X		X		X	X	X	X	X	X	X	X
<i>Lestes</i> sp.												
Hemiptera (true bugs)												
Gerridae (water striders)												
<i>Gerris</i> sp.	X	X		X	X		X	X		X	X	
Belostomatidae (toe biters)												
<i>Belostoma</i> sp.			X							X		
Corixidae (water boatmen)												
<i>Corisella</i> sp.			X			X	X	X		X	X	
Notonectidae (backswimmers)												
<i>Notonecta</i> sp.			X				X	X		X	X	
Nepidae (water scorpions)												
<i>Ranatra</i> sp.												X
Megaloptera (hellgrammites)												
<i>Protochaetodes</i> sp.											X	
<i>Sialis</i> sp.												X

**Aquatic Invertebrates from West County Reservoir Sites in Stemple Creek Drainage, May and August 1995.**

	Two Rock					Huntley		Two Rock				Huntley	
	15-May-95					18-May-95		21-Aug-95				22-Aug-95	
	Trib. 1	Trib. 2	Trib. 3	main stream	ponds	upper stream	lower stream	Trib. 2	Trib. 3	lower	main stream upper	upper stream	lower stream
<b>Annelida</b> Oligochaeta (aquatic earthworms) Naididae											X		
Hirudinea (leeches) <i>Erpobdella</i> sp. <i>Placobdella</i> sp.	X										X		
<b>Arthropoda</b> Crustacea (crustaceans) Conchostraca (clam shrimps) <i>Cyzicus californicus</i>													
Amphipoda (scuds) <i>Crangonyx</i> sp. <i>Hyalella azteca</i> <i>Anisogammarus</i> sp.		X		X	X	X	X	X			X	X	X
Isopoda (aquatic sowbugs) <i>Gaeccidotea (=Asellus) tomalensis</i>				X							X		
Cladocera (water fleas) <i>Simocephalus serrulatus</i>					X								
Decapoda (crayfish, shrimp) <i>Pacifastacus</i> sp. <i>Procambarus clarki</i> <i>Syncares pacifica</i>													X
<b>Insecta (insects)</b> Plecoptera (stoneflies) <i>Malenka</i> sp. <i>Rickera sorpta</i> <i>Calineuria californica</i> <i>Isoperla</i> sp.	X	X	X					X					
Ephemeroptera (mayflies) <i>Baetis</i> sp. <i>Callibaetis</i> sp. <i>Ironodes californicus</i> <i>Paraleptophlebia</i> sp. <i>Siphonurus</i> sp.	X	X	X	X	X	X	X	X			X	X	
Odonata Anisoptera (dragonflies) <i>Anax</i> sp. <i>Cordulia</i> sp. <i>Cordulegaster dorsalis</i> <i>Pachydiplax</i> sp. <i>Tametrus</i> sp.				X					X		X	X	
Zygoptera (damselflies) <i>Archilestes grandis</i> <i>Argia</i> sp. <i>Enallagma</i> sp. <i>Ischnura</i> sp. <i>Lestes</i> sp.		X			X	X	X	X			X	X	
Hemiptera (true bugs) Gerridae (water striders) <i>Gerris</i> sp.	X	X	X	X	X	X	X	X	X		X	X	
Belostomatidae (toe biters) <i>Belostoma</i> sp.							X	X			X		
Corixidae (water boatmen) <i>Corisella</i> sp.					X			X	X		X		X
Notonectidae (backswimmers) <i>Notonecta</i> sp.					X			X	X		X	X	X
Nepidae (water scorpions) <i>Ranatra</i> sp.											X		
Megaloptera (hellgrammites) <i>Protochauliodes</i> sp. <i>Sialis</i> sp.													

**Aquatic Invertebrates from West County Reservoir Sites in Stemple Creek Drainage, May and August 1995.**

	Two Rock					Huntley		Two Rock				Huntley	
	15-May-95					18-May-95		21-Aug-95				22-Aug-95	
	Trib. 1	Trib. 2	Trib. 3	main stream	ponds	upper stream	lower stream	Trib. 2	Trib. 3	lower	main stream upper	upper stream	lower stream
Trichoptera (caddisflies)													
<i>Homophylax</i> sp.			X										
<i>Hydropsyche</i> sp.								X					
<i>Lepidostoma</i> sp.		X						X			X		
<i>Gumaga</i> sp.		X	X							X			
<i>Pseudostenophylax edwardsi</i>	X		X			X		X	X				
<i>Parapsyche</i> sp.	X	X	X			X		X					
<i>Polycentropus</i> sp.													
<i>Rhyacophila</i> sp.													
<i>Wormaldia</i> sp.													
Coleoptera (beetles)													
Dytiscidae (predaceous diving beetles)													
dytiscid larvae and adults	X	X		X		X	X		X		X	X	
Gyrinidae (whirligig beetles)													
gyrinid adults											X	X	
Psephenidae (water pennies)													
<i>Eubrianax edwardsi</i>								X					
Hydrophilidae (water scavenger beetles)													
hydrophilid larvae and adults						X	X						
Diptera (true flies)													
Tipulidae (crane flies)													
<i>Hexatoma</i> sp.													
<i>Pedicia</i> sp.													
<i>Tipula</i> sp.											X		
Chaoboridae (phantom midges)													
<i>Chaoborus trivittatus</i>											X	X	
Culicidae (mosquitos)													
<i>Anopheles occidentalis</i>												X	
<i>Culiseta incidens</i>												X	
Dixidae (dixa midges)													
<i>Dixella</i> (=Paradixa) sp.								X			X		
Simuliidae (blackflies)													
<i>Simulium</i> sp. larvae and pupae	X					X	X						
Chironomidae (midges)													
chironomid larvae					X	X	X						
Sciomyzidae (marsh flies)													
sciomyzid larvae													
Mollusca (molluscs)													
Gastropoda (snails)													
<i>Helisoma</i> sp.								X			X		
<i>Radix auricularia</i>													
<i>Stagnicola</i> (=Lymnaea) sp.								X					
<i>Physella</i> (=Physa) sp.							X	X	X	X	X		

NUMBER OF TAXA

12 12 9 8 8 11 10 20 8 4 22 11 5

**Aquatic Invertebrates from Stream Sites, July 1995.**

	Stemple Creek (Nunes) Jul-95	Atascadero Creek Jul-95	Green Valley Creek Jul-95
<b>Annelida</b> Oligochaeta (aquatic earthworms) Naididae			
Hirudinea (leeches) <i>Erpobdella</i> sp. <i>Placobdella</i> sp.	X		
<b>Arthropoda</b> Crustacea (crustaceans) Conchostraca (clam shrimps) <i>Cyzicus californicus</i>			
Amphipoda (scuds) <i>Crangonyx</i> sp. <i>Hyalella azteca</i> <i>Anisogammarus</i> sp.	X	X	X
Isopoda (aquatic sowbugs) <i>Caecidotea (=Asellus) tomalensis</i>			
Cladocera (water fleas) <i>Simocephalus serrulatus</i>			
Decapoda (crayfish, shrimp) <i>Pacifastacus</i> sp. <i>Procambarus clarki</i> <i>Syncaris pacifica</i>			X X
<b>Insecta (insects)</b> Plecoptera (stoneflies) <i>Malenka</i> sp. <i>Rickera sorpta</i> <i>Calineuria californica</i> <i>Isoperla</i> sp.			X X
Ephemeroptera (mayflies) <i>Baetis</i> sp. <i>Callibaetis</i> sp. <i>Ironodes californicus</i> <i>Paraleptophlebia</i> sp. <i>Siphonurus</i> sp.	X		X X
Odonata Anisoptera (dragonflies) <i>Anax</i> sp. <i>Cordulia</i> sp. <i>Cordulegaster dorsalis</i> <i>Pachydiplax</i> sp. <i>Tarnetrum</i> sp.			X
Zygoptera (damselflies) <i>Archilestes grandis</i> <i>Argia</i> sp. <i>Enallagma</i> sp. <i>Ischnura</i> sp. <i>Lestes</i> sp.	X		
Hemiptera (true bugs) Gerridae (water striders) <i>Gerris</i> sp.	X	X	
Belostomatidae (toe biters) <i>Belostoma</i> sp.	X		
Corixidae (water boatmen) <i>Corisella</i> sp.	X	X	
Notonectidae (backswimmers) <i>Notonecta</i> sp.	X	X	
Nepidae (water scorpions) <i>Ranatra</i> sp.	X		
Megaloptera (hellgrammites) <i>Protochauliodes</i> sp. <i>Sialis</i> sp.			

**Aquatic Invertebrates from Stream Sites, July 1995.**

	Stemple Creek (Nunes)	Atascadero Creek	Green Valley Creek
	Jul-95	Jul-95	Jul-95
Trichoptera (caddisflies)			
<i>Homophylax</i> sp.	X		
<i>Hydropsyche</i> sp.			X
<i>Lepidostoma</i> sp.			X
<i>Gumaga</i> sp.			
<i>Pseudostenophylax edwardsi</i>			
<i>Parapsyche</i> sp.			
<i>Polycentropus</i> sp.			X
<i>Rhyacophila</i> sp.			X
<i>Wormaldia</i> sp.			X
Coleoptera (beetles)			
Dytiscidae (predaceous diving beetles)			
dytiscid larvae and adults	X	X	
Gyrinidae (whirligig beetles)			
gyrinid adults			
Psephenidae (water pennies)			
<i>Eubrianax edwardsi</i>			
Hydrophilidae (water scavenger beetles)			
hydrophilid larvae and adults			
Diptera (true flies)			
Tipulidae (crane flies)			
<i>Hexatoma</i> sp.			X
<i>Pedicia</i> sp.			
<i>Tipula</i> sp.			
Chaoboridae (phantom midges)			
<i>Chaoborus trivittatus</i>			
Culicidae (mosquitos)			
<i>Anopheles occidentalis</i>			
<i>Culiseta incidens</i>			
Dixidae (dixa midges)			
<i>Dixella</i> (=Paradixa) sp.			
Simuliidae (blackflies)			
<i>Simulium</i> sp. larvae and pupae			X
Chironomidae (midges)			
chironomid larvae			X
Sciomyzidae (marsh flies)			
sciomyzid larvae			
Mollusca (molluscs)			
Gastropoda (snails)			
<i>Helisoma</i> sp.	X		
<i>Radix auricularia</i>			
<i>Stagnicola</i> (=Lymnaea) sp.		X	
<i>Physella</i> (=Physa) sp.	X		X

NUMBER OF TAXA

13

6

17

The Appendix to this document is filed as  
Exhibit L-5