

Inventory of Tomales Bay Sites for Tidewater Goby
(*Eucyclogobius newberryi*), 2002-2003, Marin Co. California

PUBLIC VERSION



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INTRODUCTION

The Giacomini Ranch is located at the mouth of Lagunitas Creek near the town of Inverness in Marin Co., California at the southernmost end of Tomales Bay. The location is the site of a future tidal wetland restoration project by the National Park Service. Baseline biological data are required to evaluate restoration alternatives. The project area may support federally and state-listed threatened and endangered species such as the California freshwater shrimp and tidewater goby, both of which are federally listed endangered species.

The tidewater goby (*Eucyclogobius newberryi*) is a small benthic fish (<50 mm standard length) found in coastal waters in California from San Diego to Del Norte counties. It is most commonly found in slightly brackish waters (0-10 parts per thousand), although experimental studies have shown the goby to tolerate hypersaline conditions for short periods (Swift et al., 1989). It is estimated that the goby has disappeared from nearly 50 percent of the coastal lagoons since 1900 (U.S. Fish and Wildlife Service, 1994). Various factors have led to the decline of the goby including the inadvertent introduction of non-native fish and habitat degradation. These historic losses and current threats to existing populations led the U.S. Fish and Wildlife Service in 1994 to list the goby as endangered under the Endangered Species Act. Historic records indicate that the tidewater goby was last observed in 1953 in Lagunitas Creek (also called Papermill Creek) within the project vicinity (Swift et al., 1989). Surveys conducted by staff from Point Reyes national Seashore and Golden Gate National Recreation Area (hereafter called the "Parks") and project consultants in 2001-2002 identified the presence of the tidewater goby in a small portion of Tomasini Creek, which drains the Giacomini Ranch property (Fong 2003).

STUDY OBJECTIVES

Because of the presence of a very small population of tidewater gobies at the Giacomini Ranch site, the Parks were interested in determining the significance of these findings. There have been historic records of the goby being present at the lower portion of the two largest streams to Tomales Bay, Lagunitas Creek and Walker Creek (Swift et al., 1989). However, no recent reports of their continued occurrence at these sites have been documented by surveys in 1996 by USGS-Biological Resources Division (M. Saiki and C. Chamberlain, unpublished data) and in 1999 by Camm Swift and Dave Jacobs (Swift, pers. comm., 2003). Furthermore, a comprehensive literature review of studies conducted in Tomales Bay by the Pacific Marine Station did not reveal any new records of tidewater gobies from this area (Munroe 1975).

Therefore, the intent of this study was to identify potentially suitable habitat for tidewater gobies along the shoreline of Tomales Bay and to determine the presence/not found status of the tidewater goby. Because it is unlikely that there have been past nearshore fish inventories in Tomales Bay, we hoped that this

project data would provide baseline fisheries data. We were also interested in determining the extent of tidewater goby use along Tomasini Creek.

PERMITS

Sampling activities were conducted in accordance with conditions specified in the Parks' Section 10(a)(1)(A) of the Endangered Species Act permit from the U.S. Fish and Wildlife Service (subpermit no. GGNRA-2, expiration December 31, 2000 and full permit no. TE-036499-3, expiration February 3, 2007).

METHODS

Prior to field sampling, maps were used to identify shallow embayments/sloughs along the periphery of Tomales Bay that were fed by streams that could have brackish water conditions suitable for the goby. Sites not accessible by vehicle and foot were accessed by boat. These sites were typically those found on the western shoreline. At each site, water quality measurements, specifically salinity, were obtained using a YSI Model 85 or Model 30 meter.

A subset of the water quality sites were sampled for fish using either dip nets or seines. A single pass through the habitat units were done. Beach seines with either a mesh size of 1/8th or 3/16th inch with a chain mud line were used. A large tarp was placed underneath the seine to minimize loss of fish into the surrounding environment. Long-handled dip nets were used to sample densely vegetated areas or sites too small for sampling with a seine. Unknown fish were identified from digital photos or actual voucher specimens using Miller and Lea (1972) or McGinnis (1984).

Fish were placed into aerated 5-gallon buckets for subsequent measurements. All collected fish species were identified and counted. Up to 10 fish per species per site were chosen for total or standard length measurements. Measurement units are noted in the database. All fish were released upon completion of measurements at the capture site. Sample site locations within the Tomales Bay region were recorded (UTM, NAD83) with a GPS receiver (Garmin III+) (Table 1, Figure 1)

General information regarding substrate condition, vegetative cover, and sample site dimensions were collected. Tables 2 and 3 summarizes the water quality and habitat information at each sample site, respectively. Specific site notes are available from the field datasheets. Appendix I includes photos of sample site locations.

RESULTS AND DISCUSSION

Tidewater Gobies

Surveys in 2002 and 2003 at Tomasini Creek documented the continued presence of the tidewater goby, albeit at low densities. The tidewater gobies were found at sites from Station 2.0 downstream to Station 3.0, covering a distance of 560 m. Figure 2 shows the locations of these sampling stations and the extent of their distribution during the surveys. None of the captured gobies were of size ranges that indicated juveniles or pelagic larvae.

It appears that the Tomasini Creek population of tidewater gobies represents the only remaining population within Tomales Bay. As mentioned previously, recent survey efforts by Camm Swift and Charlie Chamberlain have not found tidewater gobies at previous historic localities with Tomales Bay. In addition, recent surveys conducted by a San Francisco State graduate student in 2003 focused on eelgrass and soft-bottom mud and sand habitats along the periphery of Tomales Bay. No tidewater gobies were found in these surveys, although the sampled habitats were unlikely to support them (Pettigrew 2004).

Densities of the Tomasini Creek population of tidewater gobies can be considered low. Unfortunately, the densely vegetated habitats where the goby occurs in Tomasini Creek are not easily sampled quantitatively using a seine. For one sample location (Tomasini 2), we had densities of 0.2 tidewater goby per square meter in July 2002. By comparison, Rodeo Lagoon tidewater goby mean densities during the fall ranged from 2 to 40 individuals per square meter (1995-2000) (Fong 2000).

At sites where tidewater gobies were found in Tomasini Creek, just a few species of fish were present. These included prickly sculpin, threespine stickleback, and mosquitofish. This same fish assemblage (minus mosquitofish) is found at Rodeo Lagoon where tidewater gobies are found in abundance.

Recommendations for the conservation and recovery of this species have been described in a December 12, 2003 memorandum to Kamman Hydrology & Engineering (consultants for the Giacomini Wetland restoration project). These included protecting the existing population at Tomasini Creek, completing genetic analyses to determine the evolutionary significance of the Tomasini Creek population, establishing tidewater goby population at suitable habitats locally, and artificial rearing and release. In addition, further investigations may be needed to determine the conditions that are allowing tidewater gobies to persist at Tomasini Creek and to determine localities for breeding and rearing of pelagic larvae.

Other Taxa

For all the surveyed sites, a total of 11 fish species were identified (excluding individuals identified only to genera). The collected species are those that are commonly found in brackish water conditions. Two of these species, mosquitofish and yellowfin gobies, are introduced species. An unidentified juvenile salmonid was visually identified at a McDonald's tributary station.

Reptile and amphibians were encountered at freshwater locations. At the ACR Livermore Marsh, adult and larval treefrogs were captured in seine at Station 1. One locality, Pebble Beach, had killifish listed. However, no vouchers (either photographs or specimens) were available for this observation. We assumed that this observation was erroneous and likely mosquitofish. Individuals from similar low salinity habitats at nearby Shell Beach that were identified as “killifish/mosquitofish” in the field were later verified as mosquitofish from a voucher specimen.

Threespine stickleback were the most frequently encountered fish both in terms of relative abundance and number of sites. Highest fish densities were encountered at Borello Ranch and Tomasini Creek stations (Table 6).

Macrocrustaceans were encountered at a few locations. The introduced shrimp, *Paleomon macrodactylus*, was only found in Tomasini Creek. The introduced European green crab was found at two localities, Tomasini Creek and Borello Creek.

Collected raw data for fish and macrocrustacean are provided in Appendix II.

Injury and Mortality

No mortalities or injuries to listed species occurred during sampling activities. A total of 2 topsmelt and one threespine stickleback were accidentally killed during sampling activities. Sampling activities on October 1, 2003 captured and removed 12 tidewater gobies for genetic analyses that will be conducted by Dave Jacobs, UCLA, under Camm Swift’s Sec. 10 permit. These individuals have been reported separately by Camm Swift.

ACKNOWLEDGEMENTS

Survey activities were conducted with the gracious assistance of Leslie Allen, Greg Brown, Daniel George, Jeff Parr, and Jim Whitlock (Point Reyes National Seashore), Ro Lobianco (Golden Gate National Recreation Area), Sarah Spilseth (California Dept. of Fish and Game), and Camm Swift (Entrix). Robert Lea (California Dept. of Fish and Game) provided assistance with identification of unknown larval/juvenile gobies.

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Table 1: Shallow-Water Sample Locales Along the Periphery of Tomales Bay, 2002-2003

Locale	Station	UTM N	UTM E
ACR Livermore Mash	1	4224606	508628
	2	4224565	508630
	3	4224517	508681
	4	4224444	508726
	5 (end)	4224406	508665
	5 (start)	4224397	508661
Bivalve Creek-Hwy 1	1	4215989	515780
Bivalve Slough	2 (upstream)	4215846	515652
	1 (downstream)	4215810	515608
Blakes Landing-Strauss Farm Trib.	1	4226140	507875
Borello Ranch Quarry SP	1	4217805	514051
	2	4217679	514026
	3	4217602	514003
	4	4217585	513951
	5	4217654	513920
	Panne 1 and 2	4217729	513939
Fish Hatchery Creek	1.80	4214076	515335
	2.00	4214166	515258
	3.00	4214284	515140
	WPOS 2	4214221	515278
Fish Hatchery Marsh	1	4214049	515086
	2	4214117	515013
	3	4214178	514945
Hog Island Oyster/ACR	1	4223813	509263
	2	4223843	509235
	4	4223870	509280
	5	4223880	509218
	6	4223895	509269
	8	4220936	508862
Indian Beach	9	4220923	508837
	10	4220863	508803
McDonald's Trib.	1	4226697	507621
Pebble Beach	6	4220067	509792
Pelican Point	DFG S9.1	4225942	506080
	DFG S9.2	4225948	506066
	DFG S9.3	4225916	506084
	DFG S9.4	4225882	506082
	DFG N9.1	4226803	505488
	DFG N9.2	4226797	505493
	DFG N9.3	4226797	505507
	DFG N9.4	4226779	505508
Sacramento Landing, North Cove	1	4222689	507865
	2	4222665	507806
	3	4222656	507777
	4	4222648	507727
	Tidal Slough	4222625	507678
Shallow Beach	6	4219466	510226
	7	4219466	510202

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Locale	Station	UTM N	UTM E
	8	4219452	510154
Shell Beach North		4218843	510987
Shell Beach South		4218747	511085
Tomales Beach	DFG 7	4224944	506698
Tomales Beach-Pelican Point	DFG 8.1	4225385	506396
	DFG 8.2	4225444	506355
Tomasini	1		
	1.7		
	2		
	2.05		
	2.10		
	2.15		
	2.20		
	2.4		
	2.50		
	3.00		
	4.00		
	EPOS 3		
White Gulch		4227575	504341
White Gulch, North Cove	1	4228290	504380
	2	4228271	504345
	4	4228255	504306
	5	4228275	504294

Table 2: Water Quality and General Habitat Description for Tomales Bay Survey Sites, Marin Co., 2002-2003

Locale	Habitat Description	STATION ID	Date	Meter Model	H2O temp (oC) bottom	Salinity (ppt) bottom	DO (mg/L) botto m
ACR Livermore Marsh	marsh	1	4/30/2003	YSI 30	12	0.1	
ACR Livermore Marsh	marsh	2	4/30/2003	YSI 30	12	0.1	
ACR Livermore Marsh	marsh	3	4/30/2003	YSI 30	15	0.4	
ACR Livermore Marsh	marsh	4	4/30/2003	YSI 30	13	0.4	
ACR Livermore Marsh	Main Channel	5	4/30/2003	YSI 30	16	28.6	
Bivalve	Main Channel	1	5/1/2003	YSI 30	14	0.2	
Bivalve	Main Channel	1	5/1/2003	YSI 30	13	0.1	
Bivalve	Main Channel	2	5/1/2003	YSI 30	14	0.1	
Blakes Landing Farm Strauss Trib	Main Channel	1	4/30/2003	YSI 30	19	27.9	
Blakes Landing Farm Strauss Trib	Main Channel	2	4/30/2003	YSI 30	15	0.4	
Blakes Landing Farm Strauss Trib	Main Channel	3	4/30/2003	YSI 30	14	0.4	
Borello Ranch Quarry SP	Main Channel	1	5/1/2003	YSI 30	12	0.2	
Borello Ranch Quarry SP	Main Channel	2	4/30/2003	YSI 30	18	2.5	
Borello Ranch Quarry SP	Main Channel	3	4/30/2003	YSI 30	18	4.9	
Borello Ranch Quarry SP	Main Channel	4	4/30/2003	YSI 30	22	4.7	
Borello Ranch Quarry SP	slough	5	5/1/2003	YSI 30	19	10	
Borello Ranch Quarry SP	panne	Panne 1	5/1/2003	YSI 30	18	18	
Borello Ranch Quarry SP	panne	Panne 2	5/1/2003	YSI 30		15.5	
EPOS	Old Slough	3	7/25/2002	YSI 30		22.1	
Fish Hatchery	slough	1.8	8/15/2002			4	
Fish Hatchery	slough	2	8/15/2002		23	0.2	
Fish Hatchery	Main Channel	3	8/15/2002		27	9.9	
Fish Hatchery	Main Channel	5	8/15/2002		25	26.4	
Fish Hatchery	Main Channel	6	8/15/2002		33	33.2	
Fish Hatchery Marsh	marsh	1	10/1/2003	YSI 85	15	0.2	1.8
Fish Hatchery Marsh	marsh	2	10/1/2003	ysi 85		0.4	2.6
Fish Hatchery Marsh	marsh	3	10/1/2003				
Fish Hatchery Marsh	marsh		10/1/2003	ysi 85	16	12	1
Hog Island Oyster/ACR	slough	1	4/30/2003	YSI 30	26	19.3	
Hog Island Oyster/ACR	Main Channel	2	4/30/2003	YSI 30	21	23.1	
Hog Island Oyster/ACR	Main Channel	3	4/30/3003	YSI 30	14	0.4	

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Locale	Habitat Description	STATION ID	Date	Meter Model	H2O temp (°C) bottom	Salinity (ppt) bottom	DO (mg/L) bottom
Hog Island Oyster/ACR	slough	4	4/30/2003	YSI 30	27	3.4	
Hog Island Oyster/ACR	slough	5	4/30/2003	YSI 30	30	23.2	
Hog Island Oyster/ACR	slough	6	4/30/2003	YSI 30	29	19	
Indian Beach	slough	8	10/31/2002	YSI 85	18	33.4	7
Indian Beach	slough	9	10/31/2002	YSI 85	19	34.6	7
Indian Beach	marsh	10	10/31/2002	YSI 85	11	0.2	10
McDonald's Trib	Main Channel	1	4/30/2003	YSI 30	19	28.1	
McDonald's Trib	Main Channel	2	4/30/2003	YSI 30	14	0.4	
McDonald's Trib	Main Channel	3	4/30/2003	YSI 30	14	20	
Pebble Beach		6	10/31/2002		13	0.1	9
Pebble Beach	pond	7	10/31/2002		16	0.2	7
Pelican Point	marsh	DFG N9.1	4/30/2003	YSI	19	28	
Pelican Point	marsh	DFG N9.2	4/30/2003	YSI	15	0.2	
Pelican Point	marsh	DFG N9.3	4/30/2003	YSI	16	0.3	
Pelican Point	marsh	DFG N9.4	4/30/2003	YSI	13	0.1	
Pelican Point		DFG S9.1	4/30/2003	YSI	19	30.8	
Pelican Point		DFG S9.2	4/30/2003	YSI	13	0.3	
Pelican Point		DFG S9.3	4/30/2003	YSI	15	0.2	
Pelican Point		DFG S9.4	4/30/2003	YSI	14	0.1	
Sacramento Landing Cove N	Main Channel	1	5/1/2003	YSI	16	26	
Sacramento Landing Cove N	Main Channel	2	5/1/2003	YSI	15	3.4	
Sacramento Landing Cove N	Main Channel	3	5/1/2003	YSI	14	2.3	
Sacramento Landing Cove N	Main Channel	4	5/1/2003	YSI	13	0.9	
Sacramento Landing North	slough		10/31/2002	YSI 85	18	29.7	12
Shallow Beach	slough	6	10/31/2002	YSI 85	16	18.8	12
Shallow Beach		7	10/31/2002	YSI 85	15	9	9.3
Shallow Beach	slough	8	10/31/2002		14	8.1	7
Shell Beach North	main Channel/lagoon	5	10/31/2002		8	0.3	10

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Locale	Habitat Description	STATION ID	Date	Meter Model	H2O temp (oC) bottom	Salinity (ppt) bottom	DO (mg/L) bottom
Shell Beach North		6	10/31/2002		9	1	0.8
Shell Beach North		7	10/31/2002		11	5	4.5
Shell Beach South	marsh	1	10/31/2002		11	40.4	10
Shell Beach South	marsh	2	10/31/2002		9	18.7	1
Shell Beach South	marsh	3	10/31/2002		9	32.4	4
Shell Beach South	slough	4	10/31/2002		12	29.9	4
Tomales Beach	marsh	DFG 7	4/30/2003	YSI	15	0.2	
Tomales Beach-Pelican Point	marsh	DFG 8.1	4/30/2003	YSI	23	1.1	
Tomales Beach-Pelican Point		DFG 8.2	4/30/2003	YSI	15	0	0.2
Tomasini	Main Channel	1	5/1/2003		13	0.1	
Tomasini	Main Channel	1	10/1/2003	YSI 85			
Tomasini	Main Channel	1.7	10/1/2003	ysi 85	16	16.3	1
Tomasini	main channel	2	8/15/2002			4.8	
Tomasini	Main Channel	2	10/1/2003	YSI 86	16	16.1	4
Tomasini	Main Channel	2.05	10/1/2003	YSI 85	17	19.4	5
Tomasini	main channel	2.1	8/15/2002			5.6	
Tomasini	Main Channel	2.15	10/1/2003	YSI 85			
Tomasini	main channel	2.2	8/15/2002		23	15.1	
Tomasini	Main Channel	2.4	10/1/2003	YSI 85	18	21.4	5
Tomasini	main channel	2.5	7/26/2002				
Tomasini	main channel	2.5	8/15/2002			16.7	
Tomasini	main channel	3	7/25/2002			17.7	
Tomasini	main channel	4	7/25/2002	YSI 30		24.2	
White Gulch			5/1/2003	YSI	16	16.1	
White Gulch Cove N	marsh	1	4/30/2003	YSI	25	9.8	
White Gulch Cove N	marsh	2	4/30/2003	YSI	25	5.5	
White Gulch Cove N	marsh	4	4/30/2003	YSI	24	2.2	
White Gulch Cove N	marsh	5	4/30/2003	YSI	25	1.4	
White Gulch Cove N	marsh	7	4/30/2003	YSI	21	0.4	
WPOS	slough	2	8/15/2002		27	26	

Table 3: Fish Habitat Data for Tomales Bay Survey Sites, Marin Co., 2002-2003

Date	Locale	STATION ID	Gear	Width (m)	Length (m)	Area (m2)	Max depth (m)	Min depth (m)	Ave vol. (m)	Ave depth (m)	Dom. Substrate	Subdom. Substrate	SAV	EAV	Algae
4/30/2003	ACR Livermore Marsh	1	seine (3/16" mesh)	4.5	6	27		0	5.4	0.2	muck	mud	0	0	0
4/30/2003	ACR Livermore Marsh	2	seine (3/16" mesh)	4.5	5.5	24.75		0	8.66	0.35	muck	mud	2	0	0
4/30/2003	ACR Livermore Marsh	3	seine (3/16" mesh)	4.5	4.25	19.13		0	4.21	0.22			3	0	0
4/30/2003	ACR Livermore Marsh	4	seine (3/16" mesh)	4.5	5.5	24.75	0.65	0	9.9	0.4	sand	muck	0	0	0
4/30/2003	ACR Livermore Marsh	5	seine (1/8" mesh) Dip Net (3/16" mesh)	5	20	100	0.7	0.05	35	0.35	sand	mud	0	0	1
5/1/2003	Bivalve Creek	1		3						0.25	cobble				
5/1/2003	Bivalve Slough	1	seine (3/16" mesh)	4	7.1	28.4	1.25	0	14.2	0.5	sand	gravel	0	0	1
5/1/2003	Bivalve Slough	2	seine (3/16" mesh) Dip Net (3/16" mesh)	4			1			0.7	fine sand	silt	0	0	0
4/30/2003	Blakes Landing Farm Strauss Trib	1	Dip Net (3/16" mesh)	0.5-3	30	15-90					fine sand	shells			
4/30/2003	Blakes Landing Farm Strauss Trib	2	Dip Net (3/16" mesh)								gravel				
4/30/2003	Blakes Landing Farm Strauss Trib	3	Dip Net (3/16" mesh)								gravel				
5/1/2003	Borello Ranch Quarry SP	1	seine (3/16" mesh)	4	9.4	37.6	0.4	0	6.77	0.18	gravel	mud (silty)	0	0	1
4/30/2003	Borello Ranch Quarry SP	2									gravel	silt			
4/30/2003	Borello Ranch Quarry SP	3	seine (3/16" mesh)	3.7	7	25.9	0.75	0	11.6	0.45	sand	silt	0	0	0
4/30/2003	Borello Ranch Quarry SP	4	seine (3/16" mesh)	3.7	10	37.0		0	14.8	0.4	sand	muck	0	0	0
5/1/2003	Borello Ranch Quarry SP	5	seine (3/16" mesh) Dip Net (3/16" mesh)	3	9	27		0	8.1	0.3	muck	mud	0	0	0
5/1/2003	Borello Ranch Quarry SP	Panne 1	Dip Net (3/16" mesh)	1	3	3			0.6	0.2	muck		1	0	0
5/1/2003	Borello Ranch Quarry SP	Panne 2	Dip Net (3/16" mesh)	2	5	10			2	0.2	muck		1	0	0
7/25/2002	EPOS-Tomasini	3	seine (1/8" mesh)	3	5.75	17.25	0.6	0	5.17	0.3	muck	mud	1	0	0
8/15/2002	Fish Hatchery	1.8													
8/15/2002	Fish Hatchery	2									muck				
8/15/2002	Fish Hatchery	3													
8/15/2002	Fish Hatchery	5													
8/15/2002	Fish Hatchery	6													
10/1/2003	Fish Hatchery Marsh	1	Dip Net (3/16" mesh)								mud	muck	0	3	0
10/1/2003	Fish Hatchery Marsh	2	Dip Net (3/16" mesh)				0.1				muck	mud	0	2	0
10/1/2003	Fish Hatchery Marsh	3	Dip Net (3/16" mesh)								muck	mud	0	2	0
10/1/2003	Fish Hatchery Marsh		Dip Net (3/16" mesh)				0.35				muck		0	2	0
4/30/2003	Hog Island Oyster/ACR	1	Dip Net (3/16" mesh)								gravel	sand	0	0	1
4/30/2003	Hog Island Oyster/ACR	2	Dip Net (3/16" mesh)												

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4/30/2003	Hog Island Oyster/ACR	3	Dip Net (3/16" mesh)								gravel	cobble			
4/30/2003	Hog Island Oyster/ACR	4	Dip Net (3/16" mesh)												
4/30/2003	Hog Island Oyster/ACR	5	Dip Net (3/16" mesh)												
4/30/2003	Hog Island Oyster/ACR	6	Dip Net (3/16" mesh)												
10/31/2002	Indian Beach	8	Dip Net (3/16" mesh)								gravel	mud/shells	0	0	0
10/31/2002	Indian Beach	9	Dip Net (3/16" mesh)								gravel	mud/shells	0	0	0
10/31/2002	Indian Beach	10	Dip Net (3/16" mesh)								gravel	mud/shells	0	0	0
4/30/2003	McDonald's Trib	1	Dip Net (3/16" mesh)								muck	gravel			
4/30/2003	McDonald's Trib	2	Dip Net (3/16" mesh)												
4/30/2003	McDonald's Trib	3	Dip Net (3/16" mesh)												
10/31/2002	Pebble Beach	6	Dip Net (3/16" mesh)								gravel		0	1	0
10/31/2002	Pebble Beach	7	Dip Net (3/16" mesh)								muck		3	1	0
4/30/2003	Pelican Point	DFG N9.1													
4/30/2003	Pelican Point	DFG N9.2													
4/30/2003	Pelican Point	DFG N9.3	Dip Net (3/16" mesh)	2	3	6				0.25	mud				
4/30/2003	Pelican Point	DFG N9.4	Dip Net (3/16" mesh)	3						0.15					
4/30/2003	Pelican Point	DFG S9.1													
4/30/2003	Pelican Point	DFG S9.2													
4/30/2003	Pelican Point	DFG S9.3													
4/30/2003	Pelican Point	DFG S9.4	Dip Net (3/16" mesh)												
5/1/2003	Sacramento Landing Cove N	1													
5/1/2003	Sacramento Landing Cove N	2													
5/1/2003	Sacramento Landing Cove N	3	seine	2	4					0.15	mud	sand			
5/1/2003	Sacramento Landing Cove N	4													
10/31/2002	Sacramento Landing North		Dip Net (3/16" mesh)										0	0	3
10/31/2002	Shallow Beach	6	seine (3/16" mesh)	1.7	6	10.2			1.53	0.15	sand	mud/silt	0	0	0
10/31/2002	Shallow Beach	7	Dip Net (3/16" mesh)	3	15	45					sand	mud/silt	4	0	0
10/31/2002	Shallow Beach	8	Dip Net (3/16" mesh)	1.5	5	7.5					mud		3	1	0
10/31/2002	Shell Beach North	5									sand	gravel	0	0	0
10/31/2002	Shell Beach North	6								0.25	sand	gravel	0	0	0
10/31/2002	Shell Beach North	7								0.5	sand	gravel	0	0	0
10/31/2002	Shell Beach South	1	Dip Net (3/16"	8.5	17.5	149				0.05	muck		0	1	2

Inventory of Tomales Bay Sites for Tidewater Goby (*Eucyclogobius newberryi*), Marin Co. CA

Date	Locale	STATION ID	Gear	Width (m)	Length (m)	Area (m2)	Max depth (m)	Min depth (m)	Ave vol. (m)	Ave depth (m)	Dom. Substrate	Subdom. Substrate	SAV	EAV	Algae
			mesh)												
10/31/2002	Shell Beach South	2	Dip Net (3/16" mesh)							0.10	muck		0	0	0
10/31/2002	Shell Beach South	3		4	12	48				0.05					
10/31/2002	Shell Beach South	4	Dip Net (3/16" mesh)	2	14	28			1.4	0.05					
4/30/2003	Tomales Beach	DFG 7													
4/30/2003	Tomales Beach-Pelican Point	DFG 8.1	Dip Net (3/16" mesh)												
4/30/2003	Tomales Beach-Pelican Point	DFG 8.2	Dip Net (3/16" mesh)												
5/1/2003	Tomasini	1		3	5	15	1				silt		0	1	0
10/1/2003	Tomasini	1	Dip Net (3/16" mesh)												
10/1/2003	Tomasini	1.7	Dip Net (3/16" mesh)				1	0					4	0	0
8/15/2002	Tomasini	2	Dip Net (3/16" mesh)								muck				
10/1/2003	Tomasini	2	seine (1/8" mesh)				1.3				mud		0	2	0
10/1/2003	Tomasini	2.05	seine				0.8				mud		0	2	0
8/15/2002	Tomasini	2.1	Dip Net (3/16" mesh)								muck				
10/1/2003	Tomasini	2.15	Dip Net (3/16" mesh)				1				mud		0	2	0
8/15/2002	Tomasini	2.2	Dip Net (3/16" mesh)												
10/1/2003	Tomasini	2.4	Dip Net (3/16" mesh)								muck		0	1	0
7/26/2002	Tomasini	2.5	seine (1/8" mesh)	3	2.4	7.2	0.6	0.1	1.8	0.25					
8/15/2002	Tomasini	2.5													
7/25/2002	Tomasini	3	seine (1/8" mesh)	3	4.6	13.8	1	0.3	4.83	0.35	muck		2	0	0
7/25/2002	Tomasini	4	seine (1/8" mesh)	3	3.5	10.5	1.1	0.3	4.2	0.4	mud	muck	4	0	0
5/1/2003	White Gulch		seine	2	2					0.5	mud	muck	0	0	0
4/30/2003	White Gulch Cove N	1													
4/30/2003	White Gulch Cove N	2	Dip Net (3/16" mesh)		6					0.15	muck				
4/30/2003	White Gulch Cove N	4													
4/30/2003	White Gulch Cove N	5													
4/30/2003	White Gulch Cove N	7	Dip Net (3/16" mesh)		6										
8/15/2002	WPOS-Fish Hatchery	2									muck				

KEY: SAV-submerged aquatic vegetation, EAV-emergent aquatic vegetation;
Visual cover categories: 0 (0%), 1 (0-25%), 2 (25-50%), 3 (50-75%), 4 (>75%)

Table 4: Taxa List of Fish and Macrocrustaceans Found During Survey Activities

Fish	Amphibian/Reptile	Macrocrustaceans
<i>Acanthogobius flavimanus</i> (yellowfin goby-Introd.)	<i>Hyla regilla</i> (Pacific chorus frog)	<i>Cancer sp.</i>
<i>Atherinops affinis</i> (topsmelt)	<i>Rana catesbeiana</i> (Bullfrog-Introd.)	<i>Carcinus maenus</i> (green crab-Introd.)
<i>Clevendia ios</i> (arrow goby)	<i>Taricha sp.</i> (newt)	<i>Hemigrapsus sp.</i>
<i>Cottus asper</i> (prickly sculpin)	<i>Thamnopsis elegans terrestris</i> (coast garter snake)	<i>Palaeomon macrodactylus</i> (-Introd.)
<i>Cottus sp.</i> (Unid. Sculpin)		
<i>Cymatogaster aggregata</i> (Shiner surfperch)		
<i>Eucyclogobius newberryi</i> (tidewater goby)		
<i>Gambusia affinis</i> (mosquitofish)		
<i>Gasterosteus aculeatus</i> (threespine stickleback)		
<i>Gillichthys mirabilis</i> (longjaw mudsucker)		
<i>Leptocottus armatus</i> (Pacific staghorn sculpin)		
<i>Oncorhynchus sp.</i> (salmon)		
<i>Syngnathus leptorhynchus</i> (bay pipefish)		
Unidentifieds (goby, larval fish)		

Table 5: Taxa List by Tomales Bay Survey Sites, Marin Co., 2002-2003

SPECIES	ACR Liv. Mash	Bivalve	Borello Ranch Quarry SP	Fish Hatch.	Hog Isl. Oys. ACR	Indian Beach	McDon'd Trib	Pebble Beach	Pelican Point	Sac. Land. Cove N.	Shallow Beach	Shell Beach North	Shell Beach South	Tomasini	White Gulch	White Gulch Cove N
Arrow Goby	x		x			x				x	x					
cab/staghorn																
sculpin	x															
longjaw																
mudsucker			x													
mosquitofish				x				x					x	x		
pipefish														x		
prickly sculpin														x		
salmonid?							x									
sculpin														x		
shiner surfperch														x		
staghorn sculpin	x	x	x		x				x	x	x				x	x
surfperch														x		
threespine																
stickleback	x	x	x	x	x	x	x	x	x	x	x	x		x	x	
tidewater goby														x		
topsmelt			x		x									x		
unidentified Fish									x							
Yellowfin Goby			x											x	x	
Bullfrog														x		
Coast garter snake														x		
Pacific treefrog	x															
Cancer crab		x														
Green crab			x											x		
Hemigrapsus							x									
Paleomon																
macrodactylus														x		

Table 6: Density of fish taxa by sample site locality using single-pass beach seining, Tomales Bay, Marin Co., 2002-2003

Location	Station Id	Fish Density (#/sq. m.)	Macrocrustacean Density (#/sq. m.)	Total Density (#/sq. m.)
ACR Livermore Marsh	1	0.3	0.0	0.3
	2	2.3	0.0	2.3
	3	3.8	0.0	3.8
	4	0.2	0.0	0.2
	5	0.2	0.0	0.2
Bivalve Slough	1	0.3	0.0	0.3
Borello Ranch Quarry SP	1	15.3	0.0	15.3
	3	0.7	0.0	0.7
	4	1.7	0.1	1.8
	5	2.9	0.0	2.9
EPOS	3	4.5	0.0	4.5
White Gulch		1.5	0.0	1.5
Tomasini	2.5	2.1	0.1	2.2
	3	27.8	0.1	27.9
	4	21.9	1.0	22.9
Sacramento Landing North Cove	3	5.1	0.0	5.1
Shallow Beach	6	4.2	0.0	4.2

Figure 1: Tidewater goby sample sites 2001-2003, Tomales Bay, Marin Co.
(Note: map shows some localities previously sampled within Giacomini Ranch)

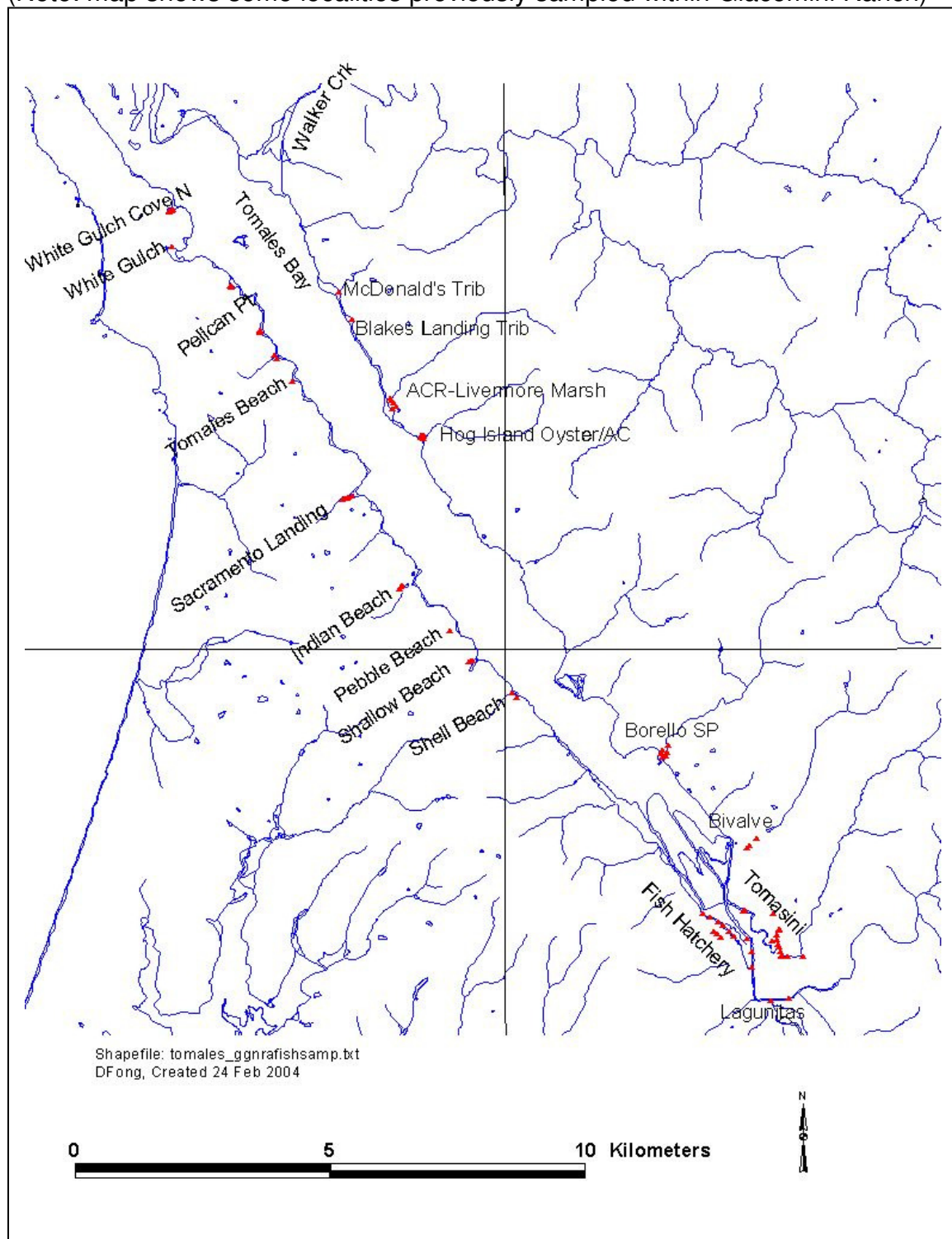


Figure 2: Extent of tidewater goby occurrence during 2002-2003 survey activities at Giacomini Ranch, Tomales Bay, Marin Co (Blue line).

MAP DELETED

Appendix I: Photographs and site descriptions

ACR Livermore Marsh Station 1 (perched marsh with stream inlet at tules)

Photo: 30 April 2003, 0905 PST



ACR Livermore Marsh Station 3 (perched marsh, submerged vegetation-
Potamogeton sp.)

Photo: 30 April 2003, 1233 PST



ACR Livermore Marsh Station 4 (slough channel)

Photo: 30 April 2003, 1032 PST



ACR Livermore Marsh Station 5 (mouth confluence with Tomales Bay looking at
Tomales Bay, some *Enteromorpha* on bottom)

Photo: 30 April 2003, 1035 PST



Bivalve Station 1 (looking downstream at station)

Photo: 1 May 2003, 1220 PST



Bivalve Station 2 (looking upstream at station)

Photo: 1 May 2003, 1220 PST



Blakes Landing-Strauss Farm Trib Station 1 (mouth confluence with Tomales Bay looking at Tomales Bay)

Photo: 30 April 2003, 1140 PST



Blakes Landing-Strauss Farm Trib Station 3 (20m above confluence with
Tomales Bay looking at Highway 1)
Photo: 30 April 2003, 1140 PST



Borello Ranch Quarry State Park Station 1

Photo: 1 May 2003, 0914 HR PST, looking upstream



Borello Ranch Quarry State Park- Panne 1

Photo: 1 May 2003, 0950 HR PST



Borello Ranch Quarry State Park- Panne 2

Photo: 1 May 2003, 0950 HR PST



Borello Ranch Quarry State Park- Station 4

Photo: 30 April 2003, 1458 HR PST



Borello Ranch Quarry State Park- Station 5

Photo: 1 May 2003, 1047 HR PST



Hog Island Oyster/ACR Station 1 (side slough confluence with main channel
looking at side slough)

Photo: 30 April 2003, 1234 PST

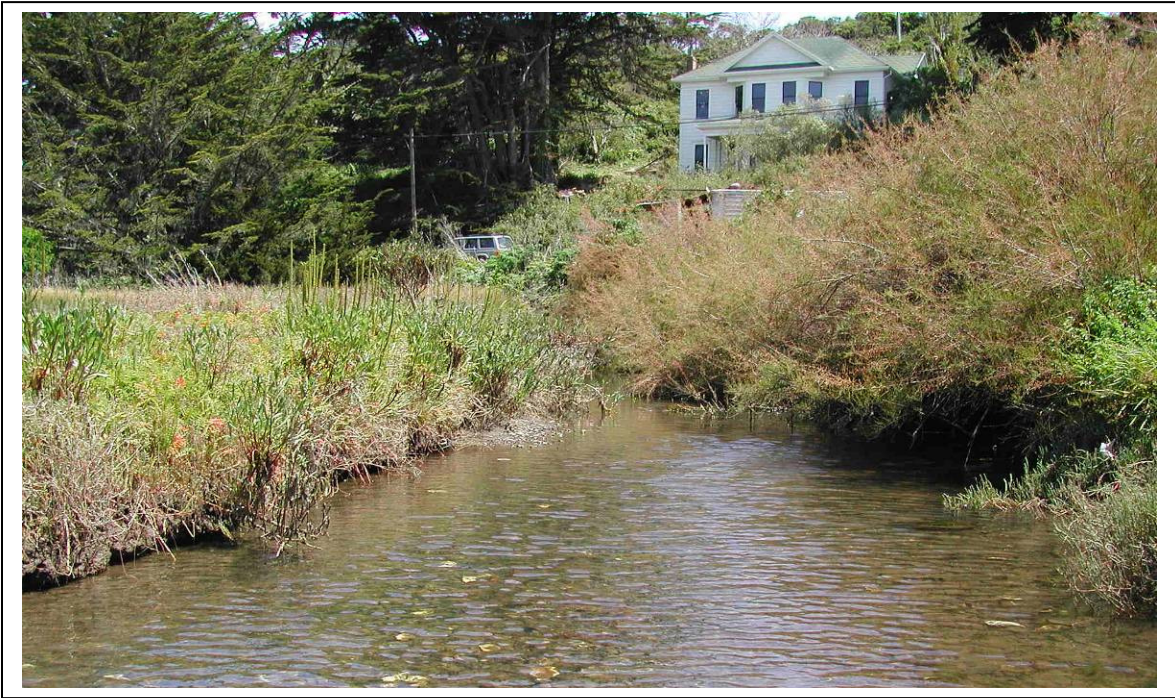


Hog Island Oyster/ACR Station 2 (main channel looking upstream)
Photo: 30 April 2003, 1229 PST



Hog Island Oyster/ACR Station 3 (main channel looking upstream to Highway 1,
significant freshwater flow, gravel-cobble bottom)

Photo: 30 April 2003, 1233 PST



McDonalds Trib. Station 1 (main channel looking downstream to mouth at Tomales Bay)

Photo: 30 April 2003, 1113 PST



McDonalds Trib. Station 2 (looking at Highway One and Sta 3)

Photo: 30 April 2003, 1113 PST



Sacramento Landing North (tidal slough, looking upstream)
Photo: 31 October 2002



Shell Beach South Station 1 (marsh, looking upstream)

Photo: 31 October 2002, 1044 PST



Appendix II: Raw fish survey data

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
ACR-L	1	4/30/2003	stickleback	9		
ACR-L	1	4/30/2003	P. treefrog	1		
ACR-L	1	4/30/2003	P. treefrog	2		
ACR-L	2	4/30/2003	s. sculpin	1	106	
ACR-L	2	4/30/2003	stickleback	55		
ACR-L	3	4/30/2003	stickleback	73		
ACR-L	4	4/30/2003	s. sculpin	1	74	
ACR-L	4	4/30/2003	s. sculpin	1	61	
ACR-L	4	4/30/2003	s. sculpin	1	55	
ACR-L	4	4/30/2003	s. sculpin	1	62	
ACR-L	5	4/30/2003	s. sculpin	1	70	
ACR-L	5	4/30/2003	s. sculpin	1	72	
ACR-L	5	4/30/2003	s. sculpin	1	81	
ACR-L	5	4/30/2003	s. sculpin	1	64	
ACR-L	5	4/30/2003	s. sculpin	1	67	
ACR-L	5	4/30/2003	s. sculpin	1	51	
ACR-L	5	4/30/2003	s. sculpin	1	33	
ACR-L	5	4/30/2003	s. sculpin	1	39	
ACR-L	5	4/30/2003	s. sculpin	1	37	
ACR-L	5	4/30/2003	s. sculpin	1	33	
ACR-L	5	4/30/2003	s. sculpin	1	33	
ACR-L	5	4/30/2003	s. sculpin	1	26	
ACR-L	5	4/30/2003	cab/s. sculpin	1	25	
ACR-L	5	4/30/2003	cab/s. sculpin	1	30	
ACR-L	5	4/30/2003	cab/s. sculpin	1	42	
ACR-L	5	4/30/2003	A. goby	1	45	
ACR-L	5	4/30/2003	A. goby	1	40	
ACR-L	5	4/30/2003	A. goby	1	43	
ACR-L	5	4/30/2003	A. goby	1	37	
ACR-L	5	4/30/2003	A. goby	1	41	
ACR-L	5	4/30/2003	A. goby	1	41	
ACR-L	5	4/30/2003	A. goby	1	43	
BIV-C	1	5/1/2003	stickleback			
BIV-S	1	5/1/2003	s. sculpin	1	57	
BIV-S	1	5/1/2003	s. sculpin	1	59	
BIV-S	1	5/1/2003	s. sculpin	1	62	
BIV-S	1	5/1/2003	s. sculpin	1	61	
BIV-S	1	5/1/2003	s. sculpin	1	59	
BIV-S	1	5/1/2003	s. sculpin	1	50	
BIV-S	1	5/1/2003	s. sculpin	1	62	
BIV-S	1	5/1/2003	s. sculpin	1	66	
BIV-S	2	5/1/2003	s. sculpin	1	56	
BIV-S	2	5/1/2003	s. sculpin	1	61	
BIV-S	2	5/1/2003	s. sculpin			
BOR	1	5/1/2003	stickleback	573		
BOR	1	5/1/2003	s. sculpin	1	74	
BOR	1	5/1/2003	s. sculpin	1	56	
BOR	1	5/1/2003	s. sculpin	1	49	
BOR	1	5/1/2003	l. mudsucker	1	49	
BOR	3	4/30/2003	Green Crab	1	100	
BOR	3	4/30/2003	s. sculpin	1	64	
BOR	3	4/30/2003	s. sculpin	1	50	
BOR	3	4/30/2003	s. sculpin	1	65	
BOR	3	4/30/2003	s. sculpin	1	36	

Inventory of Tomales Bay Sites for Tidewater Goby (*Eucyclogobius newberryi*), Marin Co. CA

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
BOR	3	4/30/2003	Topsmelt	1	67	
BOR	3	4/30/2003	Topsmelt	1	75	
BOR	3	4/30/2003	Topsmelt	1	92	
BOR	3	4/30/2003	Topsmelt	1	85	
BOR	3	4/30/2003	A. goby	1	42	
BOR	3	4/30/2003	A. goby	1	38	
BOR	3	4/30/2003	A. goby	1	44	
BOR	3	4/30/2003	A. goby	1	40	
BOR	3	4/30/2003	A. goby	1	45	
BOR	3	4/30/2003	Y. goby	2	42	
BOR	3	4/30/2003	Y. goby	1	45	
BOR	3	4/30/2003	Y. goby	1	43	
BOR	3	4/30/2003	Y. goby	1	41	
BOR	4	4/30/2003	Topsmelt	8		
BOR	4	4/30/2003	Topsmelt	1	59	
BOR	4	4/30/2003	Topsmelt	1	65	
BOR	4	4/30/2003	Topsmelt	1	52	
BOR	4	4/30/2003	Topsmelt	1	54	
BOR	4	4/30/2003	Topsmelt	1	65	
BOR	4	4/30/2003	Topsmelt	1	50	
BOR	4	4/30/2003	Topsmelt	1	65	
BOR	4	4/30/2003	Topsmelt	1	55	
BOR	4	4/30/2003	Topsmelt	1	45	
BOR	4	4/30/2003	Topsmelt	1	54	
BOR	4	4/30/2003	Topsmelt	1	65	
BOR	4	4/30/2003	Topsmelt	1	67	
BOR	4	4/30/2003	Topsmelt	1	42	
BOR	4	4/30/2003	Topsmelt	1	69	
BOR	4	4/30/2003	Topsmelt	2	60	
BOR	4	4/30/2003	A. goby	2		
BOR	4	4/30/2003	A. goby	1	41	
BOR	4	4/30/2003	A. goby	1	45	
BOR	4	4/30/2003	Y. goby	6		
BOR	4	4/30/2003	Y. goby	1	50	
BOR	4	4/30/2003	Y. goby	1	40	
BOR	4	4/30/2003	Y. goby	1	45	
BOR	4	4/30/2003	Y. goby	1	45	
BOR	4	4/30/2003	Y. goby	1	40	
BOR	4	4/30/2003	stickleback	1	55	
BOR	4	4/30/2003	I. mudsucker	12		
BOR	4	4/30/2003	I. mudsucker	1	42	
BOR	4	4/30/2003	I. mudsucker	1	25	
BOR	4	4/30/2003	I. mudsucker	1	40	
BOR	4	4/30/2003	I. mudsucker	1	35	
BOR	4	4/30/2003	I. mudsucker	1	55	
BOR	4	4/30/2003	I. mudsucker	1	50	
BOR	4	4/30/2003	I. mudsucker	1	45	
BOR	4	4/30/2003	I. mudsucker	1	45	
BOR	4	4/30/2003	I. mudsucker	1	57	
BOR	4	4/30/2003	I. mudsucker	1	57	
BOR	4	4/30/2003	Green Crab	1	100	
BOR	4	4/30/2003	Green Crab	1	65	
BOR	4	4/30/2003	Green Crab	1	75	
BOR	4	4/30/2003	juv. Cancer Crab			
BOR	5	5/1/2003	A. goby	1	17	

Inventory of Tomales Bay Sites for Tidewater Goby (*Eucyclogobius newberryi*), Marin Co. CA

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
BOR	5	5/1/2003	A. goby	1	28	
BOR	5	5/1/2003	A. goby	1	22	
BOR	5	5/1/2003	A. goby	1	29	
BOR	5	5/1/2003	A. goby	1	31	
BOR	5	5/1/2003	A. goby	1	23	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	A. goby	1	22	
BOR	5	5/1/2003	A. goby	1	22	
BOR	5	5/1/2003	A. goby	1	20	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	A. goby	1	25	
BOR	5	5/1/2003	A. goby	1	20	
BOR	5	5/1/2003	A. goby	1	22	
BOR	5	5/1/2003	A. goby	1	25	
BOR	5	5/1/2003	A. goby	1	31	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	A. goby	40		
BOR	5	5/1/2003	A. goby	1	46	
BOR	5	5/1/2003	A. goby	1	45	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	A. goby	1	25	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	A. goby	1	30	
BOR	5	5/1/2003	l. mudsucker	1	42	
BOR	5	5/1/2003	Y. goby	1	35	
BOR	5	5/1/2003	Y. goby	1	33	
BOR	5	5/1/2003	Y. goby	1	30	
BOR	5	5/1/2003	Y. goby	1	32	
BOR	5	5/1/2003	Y. goby	1	35	
BOR	5	5/1/2003	A. goby	8		
BOR	Panne 1	5/1/2003	stickleback			
BOR	Panne 2	5/1/2003	stickleback			
EPOS	3	7/25/2003	stickleback	1	41	
EPOS	3	7/25/2003	stickleback	1	18	
EPOS	3	7/25/2003	stickleback	1	27	
EPOS	3	7/25/2003	stickleback	1	48	
EPOS	3	7/25/2003	stickleback	1	32	
EPOS	3	7/25/2003	stickleback	1	25	
EPOS	3	7/25/2003	stickleback	1	37	
EPOS	3	7/25/2003	stickleback	1	32	
EPOS	3	7/25/2003	stickleback	1	59	
EPOS	3	7/25/2003	stickleback	1	34	
EPOS	3	7/25/2003	stickleback	1	33	
EPOS	3	7/25/2003	stickleback	1	21	
EPOS	3	7/25/2003	stickleback	1	24	
EPOS	3	7/25/2003	stickleback	1	22	
EPOS	3	7/25/2003	stickleback	62		
EPOS	3	7/25/2003	mosquitofish	1	29	
FIS-C	1.8	08/15/02	stickleback	17		
FIS-C	2	08/15/02	mosquitofish	2		
FIS-C	2	08/15/02	stickleback	5		
FIS-C	3	08/15/02	mosquitofish	23		
FIS-C	3	08/15/02	stickleback	2		
FIS-M	1	10/01/03	none			
FIS-M	2	10/01/03	stickleback	1		

Inventory of Tomales Bay Sites for Tidewater Goby (*Eucyclogobius newberryi*), Marin Co. CA

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
FIS-M	3	10/01/03	stickleback	1	30	
FIS-M	3	10/01/03	stickleback	1	30	
HOG	2	4/30/2003	Topsmelt	1	87	
HOG	2	4/30/2003	s. sculpin	1	72	
HOG	3	4/30/2003	stickleback			
HOG	3	4/30/2003	s. sculpin			
IND	8	10/31/2002	A. goby			
IND	9	10/31/2002	A. goby			
IND	10	10/31/2002	stickleback			
IND	10	10/31/2002	A. goby			
McD	1	4/30/2003	stickleback	1		
McD	1	4/30/2003	Hemigrapsus	1		
McD	1	4/30/2003	salmonid?	1		
PEB	6	10/31/2002	mosquitofish	4		
PEB	6	10/31/2002	stickleback	1		
PEL	DFG N9.3	4/30/03	s. sculpin	1		
PEL	DFG N9.4	4/30/03	stickleback	1		
PEL	DFG S9.4	4/30/03	s. sculpin	1		
PEL	DFG S9.4	4/30/03	Newt	1		
PEL	DFG S9.4	4/30/03	unk. fish	1		
SAC	3	5/1/2003	s. sculpin	1		57
SAC	3	5/1/2003	s. sculpin	1		56
SAC	3	5/1/2003	s. sculpin	1		27
SAC	3	5/1/2003	s. sculpin	1		48
SAC	3	5/1/2003	s. sculpin	1		48
SAC	3	5/1/2003	s. sculpin	1		54
SAC	3	5/1/2003	s. sculpin	1		51
SAC	3	5/1/2003	s. sculpin	1		38
SAC	3	5/1/2003	s. sculpin	1		54
SAC	3	5/1/2003	s. sculpin	1		35
SAC	3	5/1/2003	s. sculpin	1		28
SAC	3	5/1/2003	s. sculpin	1		29
SAC	3	5/1/2003	s. sculpin	1		27
SAC	3	5/1/2003	s. sculpin	1		29
SAC	3	5/1/2003	s. sculpin	1		53
SAC	3	5/1/2003	s. sculpin	1		55
SAC	3	5/1/2003	s. sculpin	1		28
SAC	3	5/1/2003	s. sculpin	1		50
SAC	3	5/1/2003	s. sculpin	1		48
SAC	3	5/1/2003	s. sculpin	1		51
SAC	3	5/1/2003	s. sculpin	1		48
SAC	3	5/1/2003	s. sculpin	1		48
SAC	3	5/1/2003	s. sculpin	1		47
SAC	3	5/1/2003	s. sculpin	1		31
SAC	3	5/1/2003	s. sculpin	1		27
SAC	3	5/1/2003	s. sculpin	1		28
SAC	3	5/1/2003	s. sculpin	1		29
SAC	3	5/1/2003	s. sculpin	1		44
SAC	3	5/1/2003	s. sculpin	1		51
SAC	3	5/1/2003	s. sculpin	1		57
SAC	3	5/1/2003	s. sculpin	1		62
SAC	3	5/1/2003	s. sculpin	1		44
SAC	3	5/1/2003	s. sculpin	1		56
SAC	3	5/1/2003	s. sculpin	1		39
SAC	3	5/1/2003	s. sculpin	1		44

Inventory of Tomales Bay Sites for Tidewater Goby (*Eucyclogobius newberryi*), Marin Co. CA

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
SAC	3	5/1/2003	s. sculpin	1		43
SAC	3	5/1/2003	s. sculpin	1		40
SAC	3	5/1/2003	s. sculpin	1		27
SAC	3	5/1/2003	s. sculpin	1		29
SAC	3	5/1/2003	s. sculpin	1		28
SAC	3	5/1/2003	stickleback	1		
SAC	SLO	10/31/2002	A. goby			
SHA	6	10/31/2002	A. goby	41		
SHA	6	10/31/2002	stickleback	1		
SHA	6	10/31/2002	s. sculpin	1		
SHA	7	10/31/2002	stickleback	<6		
SHA	8	10/31/2002	A. goby	1		
SHA	8	10/31/2002	stickleback	6		
SHE-N	5	10/31/2002	stickleback	1		
SHE-S	1	10/31/2002	none			
SHE-S	2	10/31/2002	mosquitofish	1	100	
SHE-S	4	10/31/2002	mosquitofish	1		
TOM	1	5/1/2003	stickleback	6		
TOM	1	10/01/03	bullfrog	3		
TOM	1	10/01/03	c.g. snake	1	700	
TOM	2	7/25/2002	stickleback	1	45	
TOM	2	7/25/2002	stickleback	1	29	
TOM	2	7/25/2002	stickleback	1	33	
TOM	2	7/25/2002	stickleback	1	19	
TOM	2	7/25/2002	stickleback	1	29	
TOM	2	7/25/2002	stickleback	1	25	
TOM	2	7/25/2002	stickleback	1	22	
TOM	2	7/25/2002	stickleback	1	18	
TOM	2	7/25/2002	stickleback	1	38	
TOM	2	7/25/2002	stickleback	1	24	
TOM	2	7/25/2002	stickleback	62		
TOM	2	7/25/2002	p. sculpin	1	100	
TOM	2	7/25/2002	p. sculpin	1	31	
TOM	2	7/25/2002	p. sculpin	1	35	
TOM	2	7/25/2002	p. sculpin	1	32	
TOM	2	7/25/2002	p. sculpin	1	30	
TOM	2	7/25/2002	t. goby	1	42	
TOM	2	7/25/2002	t. goby	1	50	
TOM	2	8/15/2002	t. goby	1	37	
TOM	2	8/15/2002	t. goby	1	41	
TOM	2	8/15/2002	t. goby			
TOM	2	8/15/2002	sculpin	14		
TOM	2	8/15/2002	stickleback	71		
TOM	2	10/01/03	stickleback	40		
TOM	2	10/01/03	t. goby	5		
TOM	2	10/01/03	sculpin	1	50	
TOM	2	10/01/03	sculpin	1	70	
TOM	2.05	10/01/03	mosquitofish	10		
TOM	2.05	10/01/03	stickleback	110		
TOM	2.05	10/01/03	t. goby	15		
TOM	2.05	10/01/03	sculpin	4		
TOM	2.1	8/15/2002	t. goby	1	42	
TOM	2.1	8/15/2002	stickleback	12		
TOM	2.1	8/15/2002	sculpin	6		
TOM	2.15	10/01/03	p. sculpin			

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Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
TOM	2.15	10/01/03	stickleback			
TOM	2.2	8/15/2002	sculpin	4		
TOM	2.4	10/01/03	p. sculpin	1	40	
TOM	2.4	10/01/03	p. sculpin	1	50	
TOM	2.4	10/01/03	pipefish	1	90	
TOM	2.4	10/01/03	stickleback	18		
TOM	2.4	10/01/03	mosquitofish	25		
TOM	2.4	10/01/03	P. macrodactylus	1		
TOM	2.4	10/01/03	Green Crab	2		
TOM	2.4	10/01/03	mosquitofish	20		
TOM	2.5	7/26/2002	stickleback	1	43	
TOM	2.5	7/26/2002	stickleback	1	13	
TOM	2.5	7/26/2002	stickleback	1	52	
TOM	2.5	7/26/2002	stickleback	1	41	
TOM	2.5	7/26/2002	stickleback	1	44	
TOM	2.5	7/26/2002	stickleback	1	52	
TOM	2.5	7/26/2002	stickleback	1	28	
TOM	2.5	7/26/2002	stickleback	1	32	
TOM	2.5	7/26/2002	stickleback	1	34	
TOM	2.5	7/26/2002	stickleback	1	24	
TOM	2.5	7/26/2002	stickleback	20		
TOM	2.5	7/26/2002	stickleback	1	54	
TOM	2.5	7/26/2002	p. sculpin	1	43	
TOM	2.5	7/26/2002	p. sculpin	1	31	
TOM	2.5	7/26/2002	p. sculpin	1	41	
TOM	2.5	7/26/2002	p. sculpin	1	29	
TOM	2.5	7/26/2002	p. sculpin	1	46	
TOM	2.5	7/26/2002	P. macrodactylus	1	63	
TOM	3	7/25/2002	stickleback	1	51	
TOM	3	7/25/2002	stickleback	1	32	
TOM	3	7/25/2002	stickleback	1	49	
TOM	3	7/25/2002	stickleback	1	27	
TOM	3	7/25/2002	stickleback	1	45	
TOM	3	7/25/2002	stickleback	1	21	
TOM	3	7/25/2002	stickleback	1	24	
TOM	3	7/25/2002	stickleback	1	41	
TOM	3	7/25/2002	stickleback	1	21	
TOM	3	7/25/2002	stickleback	1	38	
TOM	3	7/25/2002	stickleback	1	38	
TOM	3	7/25/2002	stickleback	318		
TOM	3	7/25/2002	topsmelt	1	41	
TOM	3	7/25/2002	topsmelt	1	32	
TOM	3	7/25/2002	topsmelt	1	40	
TOM	3	7/25/2002	topsmelt	1	33	
TOM	3	7/25/2002	topsmelt	1	36	
TOM	3	7/25/2002	topsmelt	1	39	
TOM	3	7/25/2002	topsmelt	1	43	
TOM	3	7/25/2002	topsmelt	1	51	
TOM	3	7/25/2002	topsmelt	1	46	
TOM	3	7/25/2002	topsmelt	1	39	
TOM	3	7/25/2002	topsmelt	1	30	
TOM	3	7/25/2002	topsmelt	1	66	
TOM	3	7/25/2002	topsmelt	32		
TOM	3	7/25/2002	Y. goby	1	71	
TOM	3	7/25/2002	pipefish	1	105	

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Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
TOM	3	7/25/2002	pipefish	1	87	
TOM	3	7/25/2002	pipefish	1	148	
TOM	3	7/25/2002	pipefish	1	120	
TOM	3	7/25/2002	surfperch	1	76	
TOM	3	7/25/2002	surfperch	1	69	
TOM	3	7/25/2002	surfperch	1	61	
TOM	3	7/25/2002	P. macrodactylus	1	45	
TOM	3	7/25/2002	P. macrodactylus	1	46	
TOM	3	7/25/2002	p. sculpin	1	33	
TOM	3	7/25/2002	mosquitofish	1	18	
TOM	3	7/25/2002	mosquitofish	1	41	
TOM	4	7/25/2002	stickleback	1	26	
TOM	4	7/25/2002	stickleback	1	28	
TOM	4	7/25/2002	stickleback	1	24	
TOM	4	7/25/2002	stickleback	1	28	
TOM	4	7/25/2002	stickleback	1	41	
TOM	4	7/25/2002	stickleback	1	25	
TOM	4	7/25/2002	stickleback	1	23	
TOM	4	7/25/2002	stickleback	1	25	
TOM	4	7/25/2002	stickleback	1	28	
TOM	4	7/25/2002	stickleback	1	23	
TOM	4	7/25/2002	stickleback	1	20	
TOM	4	7/25/2002	stickleback	1	22	
TOM	4	7/25/2002	stickleback	1	22	
TOM	4	7/25/2002	stickleback	1	24	
TOM	4	7/25/2002	stickleback	1	23	
TOM	4	7/25/2002	stickleback	1	35	
TOM	4	7/25/2002	stickleback	1	26	
TOM	4	7/25/2002	stickleback	1	25	
TOM	4	7/25/2002	stickleback	1	36	
TOM	4	7/25/2002	stickleback	1	23	
TOM	4	7/25/2002	stickleback	1	16	
TOM	4	7/25/2002	stickleback	1	21	
TOM	4	7/25/2002	stickleback	53		
TOM	4	7/25/2002	P. macrodactylus	1	54	
TOM	4	7/25/2002	P. macrodactylus	1	35	
TOM	4	7/25/2002	P. macrodactylus	1	35	
TOM	4	7/25/2002	P. macrodactylus	1	42	
TOM	4	7/25/2002	P. macrodactylus	1	46	
TOM	4	7/25/2002	P. macrodactylus	1	38	
TOM	4	7/25/2002	P. macrodactylus	1	36	
TOM	4	7/25/2002	P. macrodactylus	3		
TOM	4	7/25/2002	sh. surfperch	49		
TOM	4	7/25/2002	sh. surfperch	51		
TOM	4	7/25/2002	sh. surfperch	52		
TOM	4	7/25/2002	p. sculpin	1	63	
TOM	4	7/25/2002	p. sculpin	1	61	
TOM	4	7/25/2002	p. sculpin	1	64	
TOM-PEL	8.1	04/30/03	none			
TOM-PEL	8.2	04/30/03	none			
WHI		5/1/2003	s. sculpin	1		
WHI		5/1/2003	Y. goby	1	91	
WHI		5/1/2003	stickleback	1		
WHI		5/1/2003	stickleback	1	45	
WHI		5/1/2003	stickleback	1	69	

Locale	STATION ID	Date	SPECIES	Count	Total Len (mm)	Std. Len (mm)
WHI		5/1/2003	Y. goby	1	87	
WHI-C	2	4/30/2003	s. sculpin	1		
WHI-C	2	4/30/2003	s. sculpin	1		40
WHI-C	2	4/30/2003	s. sculpin	1		40
WHI-C	7	4/30/2003	none			

KEY:

ACR-L: Audubon Canyon Ranch Livermore Marsh

BIV-C: Bivalve Creek

BIV-S: Bivalve Slough

BOR: Borello Ranch Quarry State Park

EPOS:

FIS-C: Fish Hatchery Creek

FIS-M: Fish Hatchery Marsh

HOG: Hog Island Oyster/ACR

IND: Indian Beach

MCD: McDonalds Trib

PEB: Pebble Beach

PEL: Pelican Point

SAC: Sacramento Landing Cove N

SHA: Shallow Beach

SHE-N: Shell Beach North

SHE-S: Shell Beach South

TOM- Tomasini Creek

TOM-PEL: Tomales Beach to Pelican Pt

WHI-Whites Gulch

WHI-C: Whites Gulch Cove N

y.goby- yellowfin goby

a. goby- arrow goby

t. goby- tidewater goby

stickleback- threespine stickleback

sh. Surfperch- shiner surfperch

s. sculpin- Pacific staghorn sculpin

p. sculpin- prickly sculpin

l. mudsucker- longjaw mudsucker