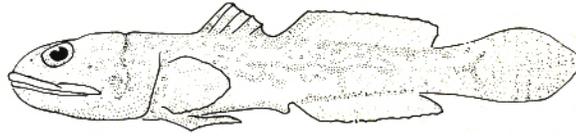
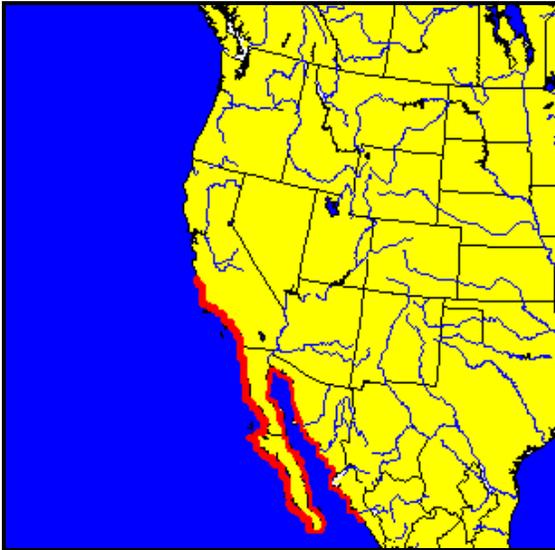


3.3.4 Shadow Goby *Quietula y-cauda*



Source: Miller and Lea 1972



Distribution map for adult shadow goby

Adult Range: From Bahía Magdalena, Baja California Sur to Morro Bay, California.

Life History: Size: to 70 mm (2.75 in.); Age at maturity: mature around 1½ years and 25 mm (1.0 in.) standard length (SL), achieving around 100 percent maturity by three years and around 30 mm (1.2 in.); Fecundity: 400-2,000 eggs per female; Life span: approximately 4.5 years.

Adult Habitat: Shallow soft-bottom habitats in bays, estuaries, lagoons, and open coastal areas; often inhabit invertebrate burrows.

Adult Fishery: No commercial or recreational fishery.

Shadow goby range from Bahía Magdalena, Baja California Sur to Morro Bay, California (Eschmeyer et al. 1983). Adults are typically found in shallow soft-bottom habitats in bays, estuaries, lagoons, and open coastal areas. While they often inhabit invertebrate burrows the males will also build burrows (Moser 1996).

Female shadow goby first mature at around 1.5 years and 25 mm (1.0 in.) standard length (SL), achieving around 100 percent maturity by three years and around 30 mm (1.2 in.) SL (Brothers 1975). Their fecundity ranges from 400-2,000 eggs per female. Gravid females are abundant in early summer in central and southern California and settling post-larvae are present from spring through early fall. Shadow goby females spawn year-round in central and southern California, producing multiple batches during the year. Burrow-building males brood eggs until they hatch; apparently guarding one female's reproductive output at a time. Longevity of shadow goby is on the order of four to five years (Brothers 1975).

Shadow and arrow gobies are often the most abundant larvae in bays (Snyder 1965, Eldridge and Bryan 1972, Percy and Myers 1974) but are not common in other nearshore collections (Tenera 2000a, b). Shadow goby larvae spend less than two

months in the plankton before settling to the bottom of shallow bays and estuaries in spring through early fall. Shadow goby larvae can be difficult to distinguish from cheekspot *Ilypnus gilberti* and tidewater goby *Eucyclogobius newberryi* larvae prior to settlement (see Appendix G for tidewater goby DNA analysis report).

Shadow goby spawning is reported to occur year-round (Brothers 1975, Moser 1996). Adults are oviparous, attaching demersal eggs to the walls of burrows. Eggs are guarded by males until they hatch releasing planktonic larvae (Moser 1996).

3.3.4.1 Shadow Goby Results

Shadow goby larvae were collected at the MBPP intake station between June and August 1999 and February and October 2000 (Figure 3-20). Their greatest abundance in intake station samples occurred in late spring and summer. They are reported to spawn year round (Moser 1996) although, while in Morro Bay, their spawning activity appears to be limited to around nine months of the year.

The length frequency distribution for a representative sample of shadow goby larvae showed a relatively narrow size range of 2.5 to 4.8 mm (0.1 to 0.19 in.) with an average size of 3.5 mm (0.14 in.) (Figure 3-21). While a small fraction of larger larvae were collected, most of the larvae were in the 3 to 4 mm (0.12 to 0.16 in.) range.

Shadow goby larvae did not occur in the paired surveys during January 2000 (Figure 3-22). Following their bay and estuarine adult distribution patterns, larval shadow goby concentrations inside Morro Bay were greater than concentrations found in Estero Bay. Their peak concentrations at source water stations occurred between April and September. As larval abundance declined, shadow goby first disappeared from Estero Bay, followed by declining abundance within Morro Bay. Shadow goby larvae occurred rarely and in low abundance at Estero Bay Station 5.

Concentration ($\#/m^3$) of larval shadow goby was compared among stations for collections made at ebb and flood tides (Figure 3-23). Larval shadow goby abundance was generally higher on ebb tides. The concentrations of larvae probably increased during ebb tides at the stations in the southernmost enclosed portion of Morro Bay (stations 3 and 4) when larvae were drawn out of the shallow mud flat and eelgrass habitats of the bay where adults are most abundant.

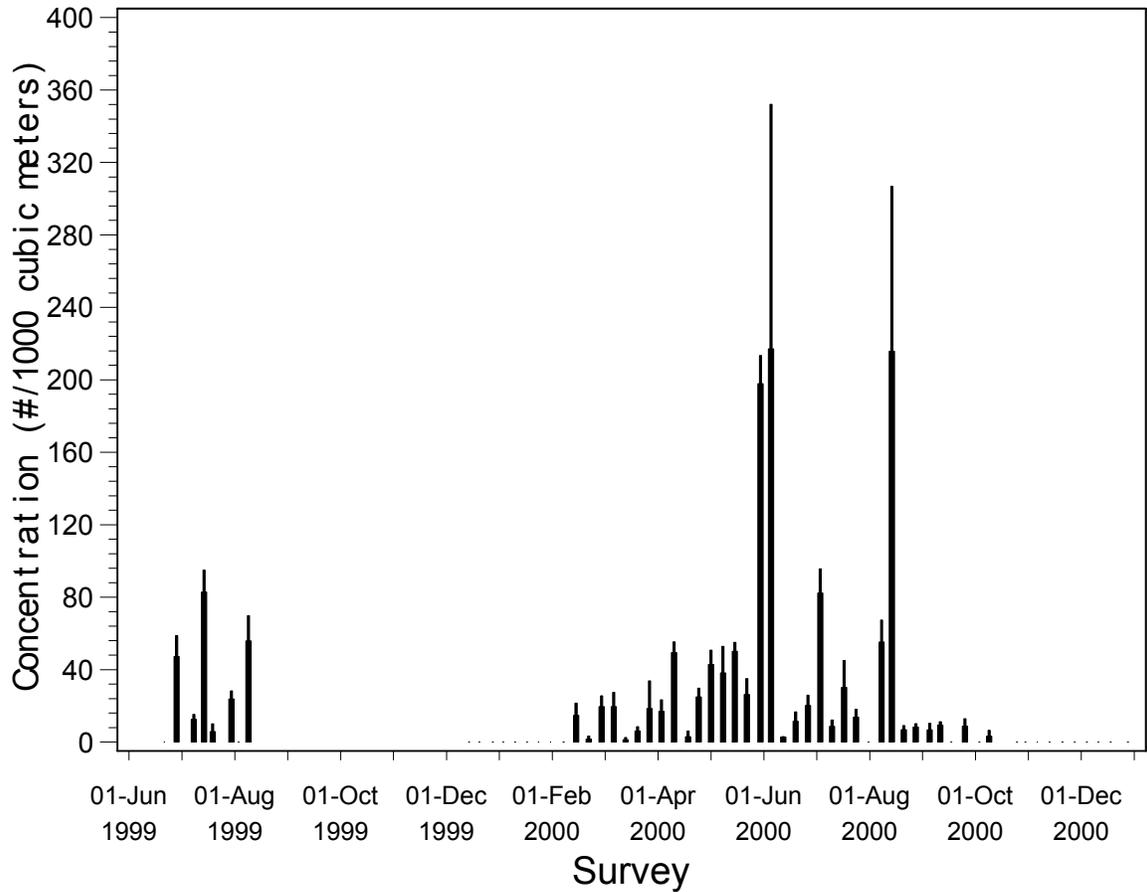


Figure 3-20. Weekly survey mean concentrations of larval shadow goby collected at the MBPP intake station with standard error indicated (+1 SE). Weekly surveys were collected from June 21 through August 10, 1999 and from December 14, 1999 through December 29, 2000.

Note: The October 16, 2000 survey was cancelled due to the unavailability of a boat.

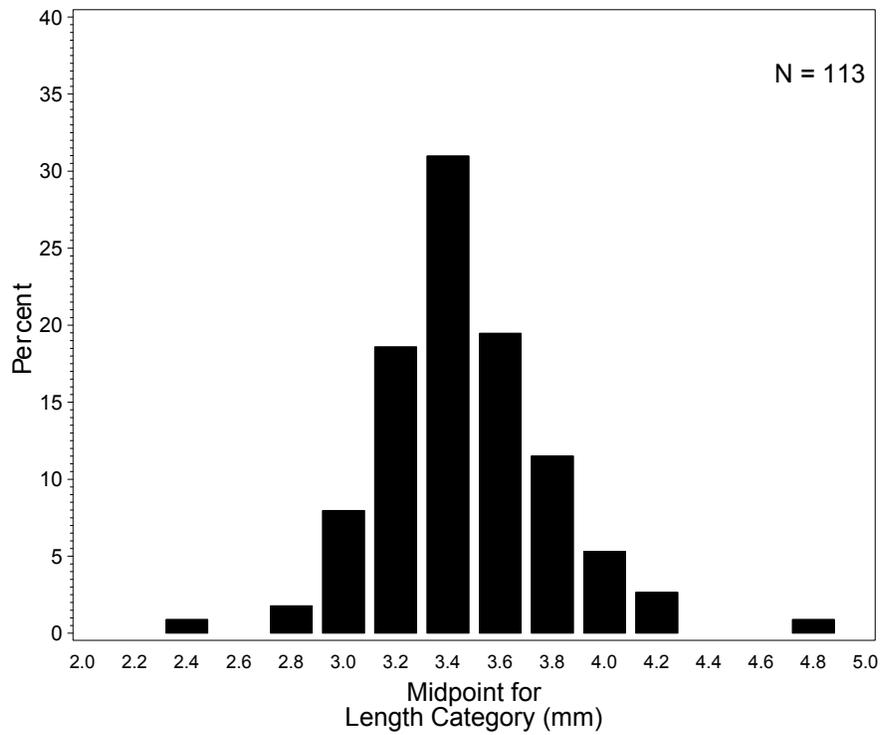


Figure 3-21. Length frequency distribution (mm) for larval shadow goby collected at the MBPP intake station from January – December 2000. The frequency distribution is based on the lengths of a representative sample of approximately 100 larvae.

Survey Station

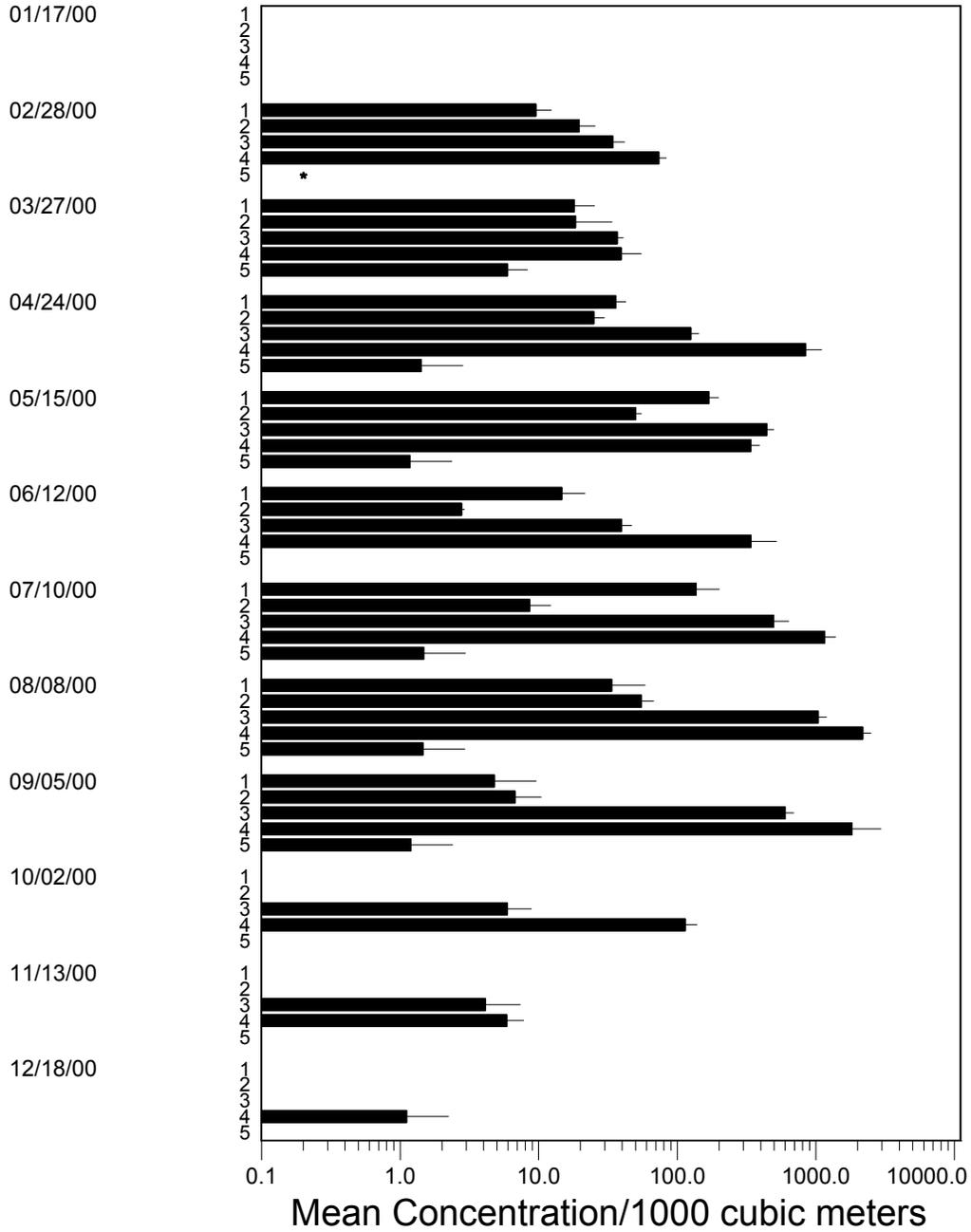


Figure 3-22. Mean larval shadow goby concentration in monthly paired surveys at the MBPP intake (Station 2), Morro Bay source water (Stations 1, 3, and 4), and Estero Bay (Station 5) from January – December 2000 with standard error indicated (+1 SE).

Note: During the January 17, 2000 survey, source water stations 1, 3, 4, and 5 were sampled only in daylight hours. Beginning in February 2000 the sampling frequency was increased to cover a 24-hour period.

* Estero Bay Station 5 could not be sampled in February 2000 due to unsafe sea conditions.

Survey Station

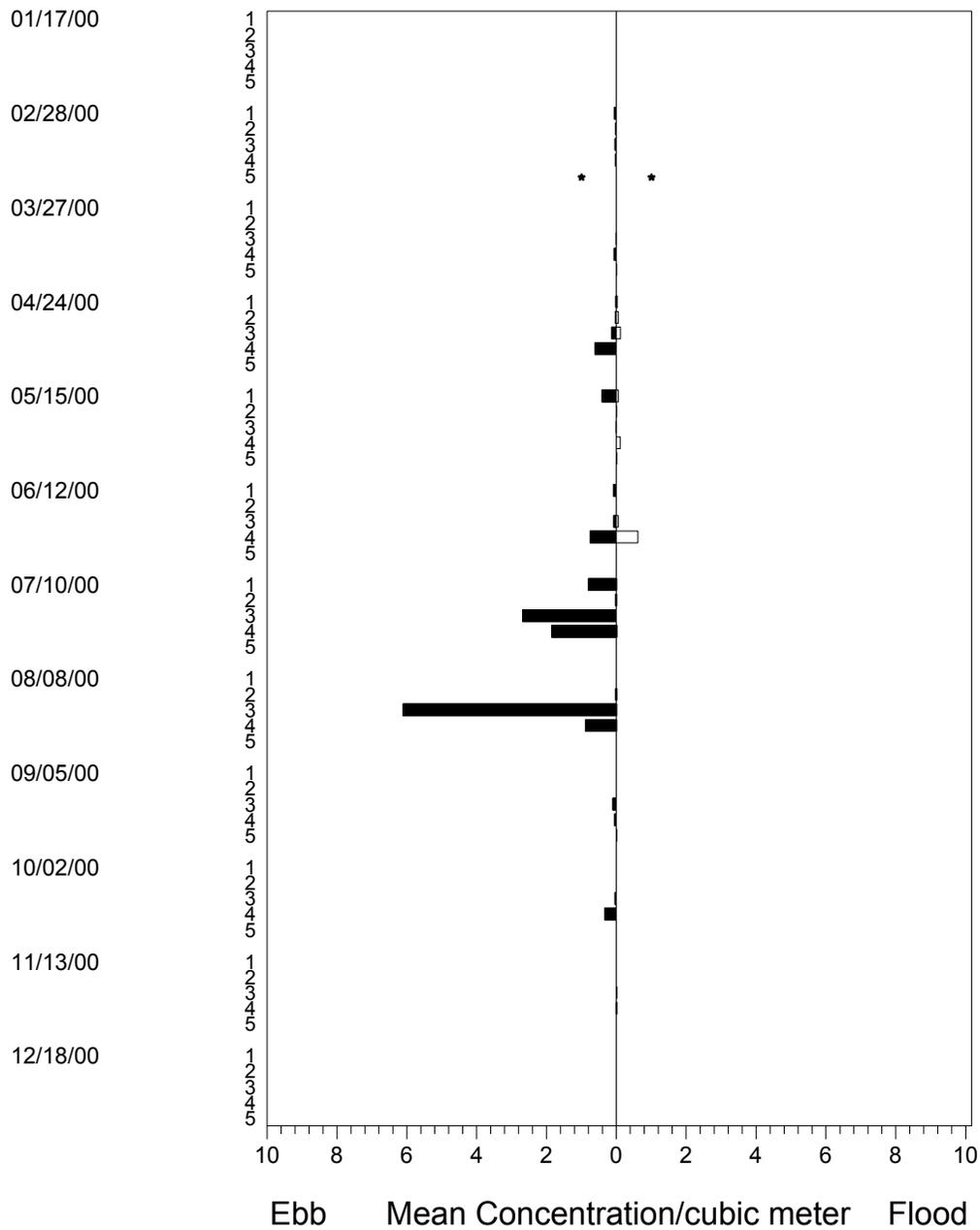


Figure 3-23. Mean concentration of larval shadow goby from monthly paired surveys by tidal current (ebb – solid bars; flood – clear bars) and sampling station (Morro Bay stations 1–4 and Estero Bay Station 5) from January – December 2000.

Note: During the January 17, 2000 survey, source water stations 1, 3, 4, and 5 were sampled only in daylight hours. Beginning in February 2000 the sampling frequency was increased to cover a 24-hour period.

*Estero Bay Station 5 could not be sampled in February 2000 due to unsafe sea conditions.

