## 2017 Benthic Invertebrate Summary

Benthic monitoring by the Environmental Monitoring Program is conducted monthly at 10 sampling sites distributed throughout several estuarine regions from San Pablo Bay upstream through the Sacramento-San Joaquin Delta (**Figure 1**). The year 2017 was a wet year for both the Sacramento Valley and San Joaquin Valley. Many benthic invertebrate species demonstrate extreme interannual and seasonal variability even in relatively average water years, and the wet year likely contributed to some of the patterns of changes we saw during this time compared to previous years.

The most saline of our sites, D41 and D41A, are polyhaline sites in San Pablo Bay. At both sites, the most numerous species was the invasive overbite clam *Potamocorbula amurensis*, whose numbers greatly increased between February and October due to seasonal recruitment, which was higher in 2017 than in drier years with higher salinity in San Pablo Bay (**Figure 2**). At D41A there was also a significant increase from August to November of the amphipod *Ampelisca abdita*. In 2017, the cumacean crustacean *Nippoleucon hinumensis* reached its regular seasonal peak density in February and March (**Figure 3**).

In Suisun Bay and Grizzly Bay in 2017, our mesohaline sites D6 and D7 both saw high numbers of the invasive clam *Potamocorbula amurensis*, which reached peak density of over twenty thousand individuals per square meter at D6. At D6, *P. amurensis* comprised over 96% of all organisms in 2017 (**Figure 4**). At D7, *P. amurensis* shared high densities with the amphipods *Corophium alienense* and *Americorophium stimpsoni*, altogether forming 86% of the community in 2017 (**Figure 5**).

At the confluence of the Sacramento and San Joaquin rivers, site D4's oligohaline community was comprised in 2017 largely of the oligochaetes *Varichaetadrilus angustipenis* and *Limnodrilus hoffmeisteri* and the amphipods *Americorophium spinicorne*, *Americorophium stimpsoni*, and *Gammarus daiberi* (Figure 6). There was a notable drop in each of the aforementioned species densities in September. The invasive clam *Corbicula fluminea* also saw high densities, which peaked in August.

In the Sacramento River, freshwater site D24 was dominated by the invasive clam *Corbicula fluminea*, whose numbers steadily increased from March up to a dramatic peak by the end of the year with densities of over 4,500 individuals per square meter in December. There was also a significant seasonal increase in densities of the amphipod *Gammarus daiberi* between July and September (**Figure 7**).

In the San Joaquin River, freshwater site D16 (at Twitchell Island) was dominated during 2017 by the amphipods *Americorophium spinicorne, Gammarus daiberi*, and *Americorophium stimpsoni*, as well as the invasive clam *Corbicula fluminea*, each having a notable density peak in August (**Figure 8**). Further upstream in the San Joaquin River, site P8 at Buckley was mostly dominated by the sabellid worm *Manayunkia speciosa*. In addition to a diverse community of freshwater oligochaetes and amphipods, the amphipod *Americorophium stimpsoni* experienced a peak density in July at P8 (**Figure 9**).

In Old River, freshwater site D28A had a diverse community in 2017. There were large numbers of the ostracod crustacean *Cyprideis sp. A* and the oligochaete *Variachaetadrilus angustipenis*, as well as the sabellid worm *Manayunkia speciosa*, which experienced a dramatic peak in February of over 19,000 individuals per square meter. The invasive clam *Corbicula fluminea* made up 71% of the mollusks at D28A, with densities peaking in June (**Figure 10**).

At Clifton Court Forebay, freshwater site C9 was dominated by a variety of annelids in 2017. *Limnodrilus hoffmeisteri, Varichaetadrilus angustipenis, Ilyodrilus frantzi, Manayunkia speciosa,* and *Aulodrilus pigueti* were all present in high numbers at C9, each with notable seasonal peaks in either May or June. The amphipod *Americorophium spinicorne* also experienced a dramatic peak in density in May (**Figure 11**). Samples were not taken at C9 in March of 2017 due to high density of water hyacinth cover.

## Figures



Figure 1. Locations of the Environmental Monitoring Program's (EMP) benthic monitoring stations.



Figure 2. Density of benthic organisms, by month, collected at station D41 (San Pablo Bay) in 2017. \*



Figure 3. Density of benthic organisms, by month, collected at station D41A (San Pablo Bay) in 2017.\*



Figure 4. Density of benthic organisms, by month, collected at station D6 (Suisun Bay) in 2017.\*



Figure 5. Density of benthic organisms, by month, collected at station D7 (Grizzly Bay) in 2017.\*



Figure 6. Density of benthic organisms, by month, collected at station D4 (Confluence) in 2017.\*



**Figure 7.** Density of benthic organisms, by month, collected at station D24 (Sacramento River at Rio Vista) in 2017.\*



**Figure 8.** Density of benthic organisms, by month, collected at station D16 (San Joaquin River at Twitchell Island) in 2017.\*



**Figure 9.** Density of benthic organisms, by month, collected at station P8 (San Joaquin River at Buckley Cove) in 2017.\*



Figure 10. Density of benthic organisms, by month, collected at station D28A (Old River) in 2017.\*



Figure 11. Density of benthic organisms, by month, collected at station C9 (Clifton Court) in 2017.\*