

2004 Annual Status and Trends Report – Common Crabs of the San Francisco Estuary

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This report summarizes the abundance trends and distributional patterns of the most common *Cancer* crabs and the Chinese mitten crab in the San Francisco Estuary. Most of the data is from the San Francisco Bay Study (Bay Study) otter trawl, with additional mitten crab data from Suisun Marsh trawls and CVP and SWP salvage.

Cancer crabs

Cancer magister, the Dungeness crab, is a valuable sport and commercial species that reproduces in the ocean in winter and rears in nearshore coastal areas and estuaries. Small juvenile *C. magister*, 5-10 mm carapace width (CW), immigrate to San Francisco Estuary in spring, rear for 8-10 months, and emigrate to the ocean in fall and winter at a size of approximately 100 mm CW. Estuary-reared crabs reach legal size at the end of their 3rd year, 1-2 years before ocean-reared crabs.

The abundance index of age-0 *Cancer magister* increased slightly in 2004 from 2003 and was the 3rd highest index for the 1980-2004 study period (Figure 1). With the strong 2004 year class, 4 of the 5 highest age-0 *C. magister* indices were in the past 4 years. We believe that these high indices were a result of cooler ocean temperatures, which result in increased embryo and larval survival, and a moderate or weak northward Davidson Current, which results in retention of larvae near shore and the Golden Gate. Although SSTs were slightly above average in winter 2003-04, nearshore temperatures were cool compared to the strong El Niño years of the 1980s and 1990s. Also, the Davidson Current was moderate when compared to years with very frequent winter storms, such as 1982, 1983, 1995, and 1998.

These recent strong year classes have been reflected in the Central California *Cancer magister* crab landings. Landings have surpassed 4 million pounds the past 3 fishing seasons, with 5.2 million pounds landed in the 2004-05 season through early February 2005; Central California landings last exceed 4 million pounds in the late 1950s. The 2001 year class of estuary-reared crabs was legal size and available to the fishery in the 2003-04 season, the 2002 year class in the 2004-05 season, and the 2003 year class will be available the 2005-06 fishing season.

In 2004, the first age-0 *Cancer magister* were collected in April, with the highest abundance in May. Catches were initially highest in the Central Bay channel, then in San Pablo Bay and Carquinez Strait as the crabs moved upstream. Similar to other recent years with high abundance, we continued to collect smaller age-0 *C. magister* at our Alcatraz Island station throughout summer and fall. Although these smaller crabs are not rearing in the estuary for their entire first year, they do contribute to the annual abundance index.

Cancer antennarius, the brown rock crab, is common to rocky areas and other areas with structure. It and *C. productus*, the red rock crab, are targeted by sport anglers fishing from piers and jetties in the higher salinity areas of the estuary. The abundance of age-0 *C. antennarius* increased dramatically in 2004, and was the highest for the study period (Table 1).

This continued the trend of above average indices since the mid-1990s. This large year class probably settled in May and June, as 79% (n=142) of crabs 5-9 mm CW was collected in June and July. In 2004, age-0 *C. antennarius* were collected from South Bay through San Pablo Bay, but were most common at shoal stations in South Bay near Alameda, in Central Bay near the Berkeley Pier, and in San Pablo Bay near Point Pinole. There was little indication of movement or migration over the year. From the distribution of age-0 *C. antennarius*, we concluded that most hatched in the Bay rather than the ocean.

Cancer gracilis, the slender crab, is smaller than the other 3 species of *Cancer* crabs, rarely exceeding 85 mm CW. It is common in open sandy or sand-mud habitats rather than rocky areas; researchers have hypothesized that because of its size it cannot compete with the rock crabs for the more "preferred" protected habitats. In contrast to *C. magister* and *C. antennarius*, the abundance of age-0 *C. gracilis* decreased in 2004 (Table 1). This followed a decade plus of relatively high indices. Age-0 *C. gracilis* were collected from South Bay through San Pablo Bay, although the San Pablo Bay collections were sporadic. The highest catches were at channel stations in Central Bay near Yerba Buena Island and Angel Island.

Cancer productus, the red rock crab, is the least common of the 4 *Cancer* crabs we usually collect in the estuary, reflecting a strong preference for rocky intertidal and subtidal marine habitats rather than its actual abundance. The 2004 abundance index of age-0 *C. productus* was almost identical to the 2003 index (Table 4). In 2004, 63% (n=32) of the age-0 *C. productus* were collected at our Alcatraz Island station, which has a substrate of cobble and small rocks.

Chinese mitten crab

Eriocheir sinensis, the Chinese mitten crab, was first collected in the estuary in the early 1990s, but likely introduced to South Bay in the late 1980s. After several years of rapid population growth and expanding distribution, the population of *E. sinensis* peaked in 1998-99 (Table 2). All data sources indicate that the population has been low the past 3 years. In 2004, the Bay Study adult *E. sinensis* mean CPUE was the lowest since 1996, the 1st year we collected it north of the Bay Bridge. Suisun Marsh adult CPUE was again zero in 2004, although several juvenile crabs were collected early in the year. The 2004 CVP and SWP estimated total salvage was approximately 1,100 crabs, slightly higher than in 2003 but still very low relative to 1998-99.

Also, public reports of *E. sinensis* sightings in 2004 to the toll-free reporting line (1-888-321-8913) dropped to the lowest level (4 reports) since the line was established in 2001. Passive habitat trapping by USFWS at 13 sites distributed throughout the Sacramento-San Joaquin Delta detected zero *E. sinensis* between July and October 2004 (Bergendorf 2005, personal communication, see notes).

The downstream migration of adult *E. sinensis* was typical of a low abundance year, with the 1st adult collected at the CVP in early September and at the SWP the 3rd week of September. Peak migration was early October at the CVP and late October at the SWP. The Bay Study first collected adult crabs in the lower Sacramento and San Joaquin rivers in October. Migration further downstream was very slow, with most crabs collected in Suisun and Honker bays through December. The first crab was collected in San Pablo Bay in January 2005; increased outflow resulted in a movement of almost all adult *E. sinensis* to San Pablo Bay by March 2005.

Acknowledgements

I thank Robert Schroeter and Ali Stover of UC Davis for the unpublished mitten crab size and catch data from Suisun Marsh and Steve Foss of DFG for the CVP and SWP salvage data.

Notes

David Bergendorf, USFWS, e-mail, May 5, 2005.

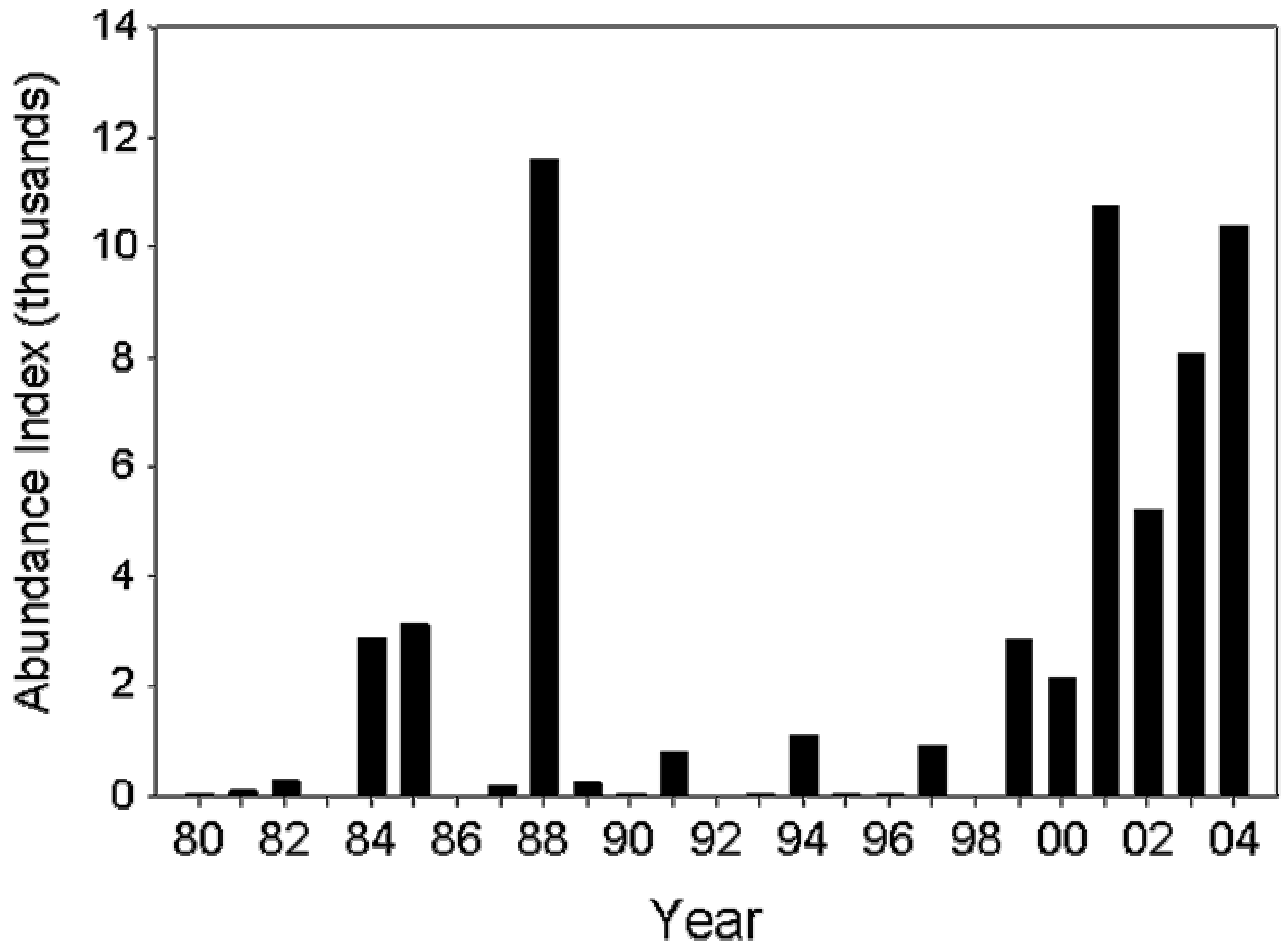


Figure 1. Annual abundance of age-0 *Cancer magister*, Bay Study otter trawl, May-July. 1980-2004.

Table 1. Annual abundance indices of age-0 *Cancer* crabs from the Bay Study otter trawl, 1980-2004. The index period is May-October for all species.

Year	<i>C. gracilis</i> age-0	<i>C. antennarius</i> age-0	<i>C. productus</i> age-0
1980	17	102	0
1981	152	76	6
1982	87	0	4
1983	151	28	4
1984	154	50	41
1985	216	20	38
1986	59	0	89
1987	93	71	79
1988	223	21	138
1989	203	29	30
1990	159	113	160
1991	656	171	128
1992	371	60	62
1993	616	398	71
1994	1017	603	166
1995	227	367	40
1996	411	1126	198
1997	1131	351	86
1998	1621	718	149
1999	222	90	249
2000	251	849	93
2001	1921	276	142
2002	796	119	238
2003	522	424	140
2004	112	1765	139

Table 2. Annual adult *Eriocheir sinensis* CPUE and estimated total salvage, 1996-2004. Bay Study CPUE is October-March, Suisun Marsh is July-December, and CVP and SWP salvage is September-November.

Year	Bay Study CPUE (#/tow)	Suisun Marsh CPUE (#/tow)	CVP salvage est. total	SWP salvage est. total
1996	0.02	0.00	50	
1997	0.34	0.07	20000	
1998	2.51	0.89	750000	
1999	0.96	1.08	90000	34000
2000	0.93	0.02	2500	4700
2001	3.25	0.17	27500	7300
2002	1.07	0.04	2400	1200
2003	0.15	0.00	650	90
2004	0.12	0.00	750	370