A Decade in Carmel Bay: Resolving the complex physical structure and flow patterns in a small, ecologically important bay

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Introduction to Carmel Bay

Carmel Bay is an ecologically important region for a variety of pelagic and intertidal species. Recently, 19 Marine Protected Areas (MPAs) were established along the central California coast within the MBNMS. Even though Carmel Bay is only ~1.6/0th the size of Monterey Bay, 4 of these MPAs are clustered in and around this small embayment. However, currently, very little is known about the circulation patterns and hydrography of Carmel Bay.

Stillwater Cove

Since 2000, the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) has maintained an oceanographic mooring in Stillwater Cove, at the northern edge of Carmel Bay (SWC, Fig. 4). This mooring collects continuous measurements of current velocity and temperature throughout the water column.

Temperature Trends

- Months with coolest temps at mid-depths vary from year to year, but generally occur between spring and summer (Apr - Oct).
- Coolest bottom temps are consistently found during spring (Apr - May)
- At certain times, the mean monthly temp at mid-depth may be colder than that at the seafloor

Weeklong survey: Aug1-8, 2008

In Aug 2008, we performed a small pilot study to investigate hydrographic conditions in Carmel Bay. In addition to the SWC mooring, from Aug 1-8 we deployed an RDI 600 kHz Workhorse ADCP in the southern region of the bay, near the mouth of the Carmel River (CR, Fig. 4).

On Aug 1 and 8, we performed across-bay transects using a towed Acrobat profiler (Fig. 5). The Acrobat collected high-resolution measurements of temperature, salinity, density, pressure and chlorophyll-a fluorescence at depths from the surface to < 35 m.

Internal Tide Signature

- SWC is generally colder (avg −0.3°C) than CR, except during transition from flood to ebb tide.
- As southern bay temp decreases, northern bay temp increases, and vice versa.
- Greatest temp differences occur during spring tide, at the transition from ebb to flood.