

UNIVERSITY OF CALIFORNIA

Los Angeles

Zooplankton Aggregations in California Coastal Zones

A dissertation submitted in partial satisfaction of the

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In Biology

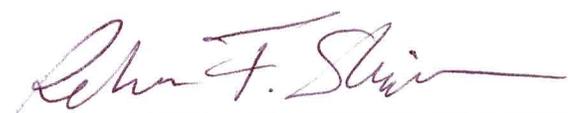
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Aaron Kimo Morris

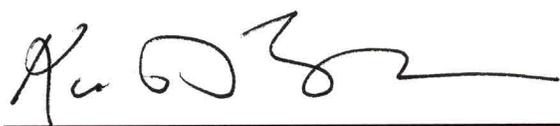
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Rebecca F. Shipe



Keith D. Stolzenbach



William M. Hamner, Committee Chair

University of California, Los Angeles

2006

DEDICATION

This dissertation is dedicated to my family –
April, Jadey Girl, Mom, Dad and Rachel.

This is also dedicated to Zoey, my iguana, for her unwavering loyalty.

Sit... good girl.

TABLE OF CONTENTS

Chapter 1: Directional Swimming Behavior Facilitates the Aggregation of Sea Nettles <i>Chrysaora fuscescens</i> Along the Monterey Upwelling Shadow, Monterey, California	1
Introduction.....	2
Materials and Methods.....	6
Daytime Characterization.....	6
In-water Jellies Observations.....	7
Results.....	9
Daytime Characterization.....	9
In-water Jellies Observations.....	11
Discussion.....	17
Figures.....	22
Literature Cited.....	45
Chapter 2: Physical and Biological Factors Determining Spatial Distribution of Zooplankton Near A Seasonal Front, Monterey Bay, California	51
Introduction.....	52
Materials and Methods.....	56
Results.....	63
April.....	63
Physical Data.....	63
Plankton Data.....	64
August.....	67
Physical Data.....	67
Plankton Data.....	70
Discussion.....	77
Tables.....	92
Figures.....	97
Appendices.....	125
Literature Cited.....	125
Chapter 3: Patterns of Flow and Plankton Distribution in the Nearshore Zone of Dockweiler State Beach, Santa Monica Bay, California	132
Introduction.....	133
Materials and Methods.....	142
Physical Data Collection.....	142
Plankton Data Collection.....	147
Results.....	152
Physical Data.....	154
May 7, 2002.....	154
July 15, 2003.....	155

July 17, 2003	158
February 21, 2004	160
September 27, 2004	163
November 4, 2004	166
Plankton Data	169
May 7, 2002	170
July 15, 2003	171
July 17, 2003	173
February 21, 2004	174
September 27, 2004	176
November 4, 2004	179
Discussion	182
Conclusion	201
Tables	204
Figures	213
Appendices	248
Literature Cited	304

LIST OF TABLES

Table 2-1. Zooplankton abundance per cubic meter, April 24, 2000.....	93
Table 2-2. Forward step-wise multiple linear regression summary statistics for each significant taxa, April 24, 2000. Details are presented in Appendix B.....	94
Table 2-3. Zooplankton abundance per cubic meter, August 23-24, 2000.....	95
Table 2-4. Forward step-wise multiple linear regression summary statistics for each significant taxa, August 23-24, 2000. Details are presented in Appendix B.....	96
Table 3-1. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in the study site on May 7, 2002. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-1.....	205
Table 3-2. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in the study site on July 15, 2003. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-2.....	206
Table 3-3. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in the study site on July 17, 2003. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-3.....	207
Table 3-4. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in neuston tows from the study site on February 21, 2004. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-4.....	208
Table 3-5. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in vertical tows from the study site on September 27, 2004. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-5.....	209
Table 3-6. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in neuston tows from the study site on September 27, 2004. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In	

such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-6.....	210
Table 3-7. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in vertical tows from the study site on November 4, 2004. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-7.....	211
Table 3-8. Forward step-wise multiple linear regression summary statistics for each significant zooplankton taxa in neuston tows from the study site on November 4, 2004. Reported p-values are cumulative for all significant independent explanatory variables and may not collectively reflect a significant result. In such a case, the species will still be included if at least one independent variable contributes to explaining the species distributional variability. Details are presented in Appendix C-8.....	212

LIST OF FIGURES

Figure 1-1. Station locations of daytime CTD vertical casts and towfish path, northern Monterey Bay, California. August 23-25, 2000.....	23
Figure 1-2. Station location for nighttime video transects designated by Julian day (23-25 August correspond with 236-238) and transect order, northern Monterey Bay, California. August 23-25, 2000.....	24
Figure 1-3. Advanced Very High Resolution Radiometry (AVHRR) satellite image of sea surface temperature in northern Monterey Bay, California. August 23-25, 2000.....	25
Figure 1-4. Integrated vertical temperature profiles along three transects with station locations depicted as vertical dotted lines, northern Monterey Bay, California. August 23-25, 2000.....	26
Figure 1-5. Abundance histograms of the scyphomedusae <i>Chrysaora fuscescens</i> and <i>Aurelia</i> sp. along three transects with corresponding temperature profiles, northern Monterey Bay, California. August 23-25, 2000.....	27
Figure 1-6. Integrated sea surface temperature interpolation from <i>in situ</i> sea surface readings along three transects in Monterey Bay, California. August 23-25, 2000.....	28
Figure 1-7. Integrated towfish transect showing temperature (°C), fluorescence, transmissivity, and density along one transect, northern Monterey Bay, California. August 23-25, 2000.....	29
Figure 1-8a. ROV video transect 236-1 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	30
Figure 1-8b. ROV video transect 236-2 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	31
Figure 1-8c. ROV video transect 237-1 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	32
Figure 1-8d. ROV video transect 237-2 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	33
Figure 1-8e. ROV video transect 237-3 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	34
Figure 1-8f. ROV video transect 238-4 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	35
Figure 1-8g. ROV video transect 238-6 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.....	36

Figure 1-8h. ROV video transect 238-7 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	37
Figure 1-8i. ROV video transect 238-9 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	38
Figure 1-8j. ROV video transect 238-2 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	39
Figure 1-8k. ROV video transect 238-3 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	40
Figure 1-8l. ROV video transect 238-1 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	41
Figure 1-8m. ROV video transect 238-8 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	42
Figure 1-8n. ROV video transect 238-5 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	43
Figure 1-8o. ROV video transect 238-10 data including depth, temperature, <i>C. fuscescens</i> counts, and proportional swimming orientation. August 23-25, 2000.	44
Figure 2-1. Advanced Very High-Resolution Radiometry (AVHRR) sea surface temperature (SST) image from April 24, 2000. Data were obtained through the CoastWatch West Coast Regional Node website, www.coastwatch.pfel.noaa.gov .	98
Figure 2-2. Location of paired vertical plankton net tows along a line transect, April 24, 2000.	99
Figure 2-3. Illustration and dimensions of the towed vertical plankton net.	100
Figure 2-4. Advanced Very High-Resolution Radiometry (AVHRR) sea surface temperature (SST) image from August 11, 2000. Data were obtained through the CoastWatch West Coast Regional Node website, www.coastwatch.pfel.noaa.gov .	101
Figure 2-5. Location of vertical conductivity-temperature-depth (CTD) casts, plankton net tows, and minibat towed profiler (with CTD, fluorometer and transmissometer) along three line transects, August 23-24, 2000.	102
Figure 2-6a. Bar graphs of the proportion of each holoplanktonic taxon along the April 24, 2000 transect. The x-axis denotes the tow locations, each separated by a 2 km distance. The y-axis is the percentage of the total transect catch for each taxon, normalized for volume. A strong thermal front was located on tow 2.	103
Figure 2-6b. Bar graphs of the proportion of each meroplanktonic taxon along the April 24, 2000 transect. The x-axis denotes the tow locations, each separated by	

a 2 km distance. The y-axis is the percentage of the total transect catch for each taxon, normalized for volume. A strong thermal front was located on tow 2.....	104
Figure 2-7. False color image of sea surface temperature (SST) on August 23-24, 2000, generated using an inverse-distance interpolation. Temperature values are at a depth of 1 meter, taken from <i>in situ</i> CTD casts along all three transects.....	105
Figure 2-8. False color image of temperature profiles along three transects on August 23-24, 2000, generated using an inverse-distance interpolation. Surface fronts are visible between 4 and 5 km along the transects.....	106
Figure 2-9. False color profiles of temperature, fluorescence, transmissivity and density along transect 2 on August 23, 2000, generated using an inverse-distance interpolation. A surface front was visible at 4 km along the transect.....	107
Figure 2-10. Surface currents from high frequency coastal radar (CODAR), averaged over 1200-1400 hrs, August 24, 2000. Data were provided by the Naval Postgraduate School Department of Oceanography, Radar and Drifter (RAD) Laboratory.....	108
Figure 2-11. Scatterplots of temperature and salinity versus density, and temperature versus salinity. A Pearson correlation matrix revealed a highly significant correlation between temperature and density, and no significant correlation between salinity with either temperature or density. Therefore, any change in density can be explained entirely by temperature change alone.....	109
Figure 2-12a. Bar graphs of the proportion of each holoplanktonic taxon along the August 23-24, 2000 transects. The x-axis demonstrates the tow locations. The y-axis is the percentage of the total transect catch for each taxon, normalized for volume. A front was located along each transect at T1-4, T2-3 and T3-3.....	110
Figure 2-12b. Bar graphs of the proportion of each meroplanktonic taxon along the August 23-24, 2000 transects. The x-axis demonstrates the tow locations. The y-axis is the percentage of the total transect catch for each taxon, normalized for volume. A front was located along each transect at T1-4, T2-3 and T3-3.	111
Figure 3-1. Line transect offshore of Dockweiler State Beach, Santa Monica Bay, California. Operations were conducted on the RV Sea World UCLA (black line), and the RV UCLA Whaler (blue line). Tracks extended from the 10m isobath out 5km (solid line), except on Sept. 27, 2004, when tracks extended to 8km, and on Nov. 4, 2004, when tracks extended to 10km (dotted line). A conductivity-temperature (CT) mooring was set at the 25m isobath during the Feb. 21, Sept. 27 and Nov. 4, 2004 cruises.....	214
Figure 3-2. Diagram of drifter assembly. A 208 L perforated drum is suspended to a pre-designated depth via a line attached to a buoy. To increase visibility of the drogue, the buoy was secured to a 6.5 m fiberglass flagpole and two supporting floats. Drifters deployed shoreward of the 10 m isobath consisted only of the drum and buoy, and were not attached to a flagpole.....	215
Figure 3-3. Diagram of mooring assembly. Deployment occurred along the 25m isobath. A subsurface float was used to keep the line taut while a surface buoy marked the location. An RBR Ltd. model XR-420 CTD was attached to the line	

at the thermocline. The depth of the thermocline was determined by performing a CTD cast and immediately inspecting the profile upon retrieval.....	216
Figure 3-4. Illustration and dimensions of the towed vertical plankton net with center-mounted Seabird SeaCat Profiler SBE 19 (unpumped) CTD.....	217
Figure 3-5. Top-view diagram of paired neuston tow arrangement. Two plankton nets (250mm mesh, 0.5m diameter, 3m length) were fitted to a cross beam mounted on the bow of the RV UCLA Whaler, a 17 ft Montauk Boston Whaler. When idling forward at a speed of 2 kn, the nets remained just beneath the surface and outside of the boat wake.....	218
Figure 3-6. May 7, 2002, data summary. (a) Tidal graph with overlaid sampling time. (b) Drogue tracks. Drogue 1 was set at 3m depth on the 8m isobath. Drogue 2 was set at 5m depth on the 10m isobath. Drogues 3, 4, 5 and 6 were set in 1km intervals offshore of drogue 2, and were all set at 12m depth. Raw data are provided in Appendix A-1. (c) Vertical temperature profile showing a thermocline in the nearshore between 7 and 8m depth. In the offshore portion, the thermocline is deeper and less pronounced. Also, a surface temperature break is evident between 2 and 2.5 km offshore.....	219
Figure 3-7. Drogue vectors, July 15, 2003, Santa Monica Bay, California. Drogue 1 was set at 5m depth inshore of the 10m isobath. Immediately after slack tide, drogue 1 was relocated back out to the same starting distance from shore. Drogue 2 was set at 5m depth, 2km offshore of drogue 1. Drogues 3, 4 and 5 were deployed 4 km offshore of drogue 1, at 26, 10 and 5m depth, respectively. Raw data are provided in Appendix A.....	220
Figure 3-8. ADCP profiles along the transect on July 15, 2003. Alongshore and onshore-offshore velocities and echo amplitude intensity are shown for seven runs. In the alongshore velocity plots, red indicates northward flow and blue indicates southward flow. In the onshore-offshore velocity plots, red indicates flow onshore and blue indicates offshore flow. Echo amplitude intensity plots give a measure of suspended particles in the water column, which are interpreted as representing plankton densities. Red indicates high concentrations of plankton while blue indicates a thin distribution of plankton.....	221
Figure 3-9. Interpolated transect vertical profiles of temperature, salinity and density during two passes on July 15, 2003. Cast locations are shown as vertical dotted lines where each dot represents a 1-meter bin.....	222
Figure 3-10. Drogue vectors, July 17, 2003, Santa Monica Bay, California. Drogue 1 was set immediately outside the 10m isobath. Drogues 2-5 were deployed in 1km intervals offshore of drogue 1. All drogues were set at 5m depth. Raw data are provided in Appendix A.....	223
Figure 3-11. ADCP profiles along the transect on July 17, 2003. Alongshore and onshore-offshore velocities and echo amplitude intensity are shown for seven runs. In the alongshore velocity plots, red indicates northward flow and blue indicates southward flow. In the onshore-offshore velocity plots, red indicates flow onshore and blue indicates offshore flow. Echo amplitude intensity plots give a measure of suspended particles in the water column, which are	

interpreted as representing plankton densities. Red indicates high concentrations of plankton while blue indicates a thin distribution of plankton.	224
Figure 3-12. Interpolated transect vertical profiles of temperature, salinity and density during four passes on July 17, 2003. Cast locations are shown as vertical dotted lines where each dot represents a 1-meter bin.	225
Figure 3-13. Drogue vectors, Feb. 21, 2004, Santa Monica Bay, California. Drogue 1 was set at 5m depth inshore of the 10m isobath. Drogue 2 was set at 10m depth, 1km offshore of the 10m isobath. Drogues 3 and 4 were deployed 2.5km offshore of the 10m isoabth, at 10 and 20m depth, respectively. Drogues 5 and 6 were deployed 4km offshore of the 10m isoabth, at 10 and 20m depth, respectively. At slack tide, all drogues were re-deployed at their starting position. Raw data are provided in Appendix A.	226
Figure 3-14. ADCP profiles along the transect on February 21, 2004. Alongshore and onshore-offshore velocities and echo amplitude intensity are shown for seven runs. In the alongshore velocity plots, red indicates northward flow and blue indicates southward flow. In the onshore-offshore velocity plots, red indicates flow onshore and blue indicates offshore flow. Echo amplitude intensity plots give a measure of suspended particles in the water column, which are interpreted as representing plankton densities. Red indicates high concentrations of plankton while blue indicates a thin distribution of plankton.	227
Figure 3-15. Interpolated transect vertical profiles of temperature, salinity and density during two passes on February 21, 2004. Cast locations are shown as vertical dotted lines where each dot represents a 1-meter bin.	228
Figure 3-16. Plots of temperature and depth over time at the thermocline located approximately 2.5 km from shore, February 21, 2004. The mooring was set on the 25m isobath with the CTD affixed at the thermocline (approximately 17m). The temperature plot suggests multiple scales of oscillation as a result of many forces, including internal tides, internal waves, and wind forcing. Since the CTD was fixed in place, the harmonic mean plot (blue line) illustrates the change in mean tidal height as the depth of water above the CTD throughout the day. This line does not exactly follow the predicted tidal height. The deeper morning average depth (17.4m) precedes the 0930 hrs high tide by approximately 40 minutes, and the shallower afternoon depth (16.1m) appears at 1400 hrs, 2.5 hours before low tide. At approximately 0917 hrs, a temperature drop of almost 0.5°C was observed as the thermocline was elevated with the rising tide, overtaking the fixed CTD position. As the day progressed, the average temperature gradually increased as the tidal height decreased until approximately 1345 when it appears the thermocline had descended below the CTD position, as indicated by the 0.25°C increase. However, the temperature range over the sampling period was small compared to that observed in subsequent surveys, and the shorter period oscillations generally ranged by less than 0.1°C.	229
Figure 3-17. Drogue vectors, Sept. 27, 2004, Santa Monica Bay, California. Drogue 1 was set at 5m depth inshore of the 10m isobath. At 0930 hrs, drogue 1 was re-	

<p>deployed at its initial starting position. Once during ebb tide, drogue 1 was pulled offshore to prevent beaching. Drogues 2 and 3 were set at 10 and 20m depth, respectively, 2km offshore of the 10m isobath. Drogues 4 and 5 were set at 10 and 20m depth, respectively, 4km offshore of the 10m isobath. Raw data are provided in Appendix A.</p>	230
<p>Figure 3-18. ADCP profiles along the transect on September 27, 2004. Alongshore and onshore-offshore velocities and echo amplitude intensity are shown for seven runs. In the alongshore velocity plots, red indicates northward flow and blue indicates southward flow. In the onshore-offshore velocity plots, red indicates flow onshore and blue indicates offshore flow. Echo amplitude intensity plots give a measure of suspended particles in the water column, which are interpreted as representing plankton densities. Red indicates high concentrations of plankton while blue indicates a thin distribution of plankton.</p>	231
<p>Figure 3-19. Interpolated transect vertical profiles of temperature, salinity and density during three passes on September 27, 2004. Cast locations are shown as vertical dotted lines where each dot represents a 1-meter bin.</p>	232
<p>Figure 3-20. Plots of temperature and depth over time at the thermocline located approximately 2.5 km from shore, September 27, 2004. The mooring was set on the 25m isobath with the CTD affixed at the thermocline (approximately 18m). The middle temperature plot suggests multiple scales of oscillation as a result of many forces, including internal tides, internal waves, and wind forcing. Since the CTD was fixed in place, the harmonic mean plot (blue line) illustrates the change in mean tidal height as the depth of water above the CTD throughout the day. This line does not exactly follow the tidal prediction. The deeper morning average depth (18.6m) precedes the 0937 hrs high tide by approximately 45 minutes, however the shallower afternoon depth (17.2m) appears at 1530 hrs, precisely coinciding with the low tide. Before and after the afternoon low tide, internal waves were observed propagating through the study site. These are expanded in plots above and below the middle graphic, showing temperature changes up to 2°C over 5-10 minute intervals.</p>	233
<p>Figure 3-21. Sea surface temperature and chlorophyll concentration along nine onshore runs, September 27, 2004.</p>	234
<p>Figure 3-22. Drogue vectors, Nov. 4, 2004, Santa Monica Bay, California. Drogue 1 was set at 6m depth on the 8m isobath. Drogues 2 and 3 were set at depths of 10 and 20m, 2km offshore of the 10m isobath. Drogues 4 and 5 were set at depths of 10 and 20m, 4km offshore of the 10m isobath. Raw data are provided in Appendix A.</p>	235
<p>Figure 3-23. ADCP profiles along the transect on November 4, 2004. Alongshore and onshore-offshore velocities and echo amplitude intensity are shown for seven runs. In the alongshore velocity plots, red indicates northward flow and blue indicates southward flow. In the onshore-offshore velocity plots, red indicates flow onshore and blue indicates offshore flow. Echo amplitude intensity plots give a measure of suspended particles in the water column, which</p>	

are interpreted as representing plankton densities. Red indicates high concentrations of plankton while blue indicates a thin distribution of plankton.	236
Figure 3-24. Interpolated transect vertical profiles of temperature, salinity and density during three passes on November 4, 2004. Cast locations are shown as vertical dotted lines where each dot represents a 1-meter bin.	237
Figure 3-25. Plots of temperature and depth over time at the thermocline located approximately 2.5 km from shore, November 4, 2004. The mooring was set on the 25m isobath with the CTD affixed at the thermocline (approximately 22.5m). The top temperature plot suggests multiple scales of oscillation as a result of many forces, including internal tides, internal waves, and wind forcing. A general trend of increasing temperature over time reflects the deepening thermocline detected also in the CTD profile passes. Since the CTD was fixed in place, the harmonic mean plot (blue line) illustrates the change in mean tidal height as the depth of water above the CTD throughout the day. This line closely follows the predicted tidal height, but not precisely. The shallowest depth occurred at approximately 1100 hrs, 2.5 hours after the actual low tide. Since the absolute range in sea surface height only varied by 0.5 ft during the entire sampling period, and the difference between the predicted tidal height at 0830 and 1100 hrs was only 0.2 ft, the discrepancy is likely a result of the detection limitation of the CTD in discerning real change from stochasticity. Internal waves were observed propagating through the study site over most of the sampling period, however they were most intense between 0845 and 0930 hrs with temperature oscillations over 5-10 minute intervals of up to 1.2°C. After this period, the temperature oscillations decreased to 0.3°C. This is depicted in the lower graphic.	238
Figure 3-26. Sea surface temperature and chlorophyll concentration along nine onshore runs, November 4, 2004.	239
Figure 3-27. Station clustering dendrogram and percent species mean coincidence table for vertical plankton tows, May 7, 2002. The abundance data were log transformed and subject to hierarchical agglomerative clustering (Everitt, 1980). A vertical line was drawn to illustrate the most dissimilar station groupings. The species-station coincidence table symbols provide a visual representation of whether or not a species is skewed in its distribution across all stations. This was determined by dividing the concentration of each species at a station by the average over all the stations. Values between 75 and 125 percent (gray squares) contribute less to skewing whereas values greater than or less than this range contribute more to skewing, low values (white squares) are under-represented and high values (black squares) are over-represented. Species are arranged based on their degree of skewed offshore (top species) or onshore (bottom species). Only species that contributed more than 0.1% to the overall abundance are shown.	240
Figure 3-28. Station clustering dendrogram and percent species mean coincidence table for vertical plankton tows, July 15, 2003. Interpretation details are provided in the Figure 3-27 caption.	241

Figure 3-29. Station clustering dendrogram and percent species mean coincidence table for vertical plankton tows, July 17, 2003. Interpretation details are provided in the Figure 3-27 caption.....	242
Figure 3-30. Station clustering dendrogram and percent species mean coincidence table for neuston plankton tows, February 21, 2004. Interpretation details are provided in the Figure 3-27 caption.....	243
Figure 3-31. Station clustering dendrogram and percent species mean coincidence table for vertical plankton tows, September 27, 2004. Interpretation details are provided in the Figure 3-27 caption.....	244
Figure 3-32. Station clustering dendrogram and percent species mean coincidence table for neuston plankton tows, September 27, 2004. Interpretation details are provided in the Figure 3-27 caption.....	245
Figure 3-33. Station clustering dendrogram and percent species mean coincidence table for vertical plankton tows, November 4, 2004. Interpretation details are provided in the Figure 3-27 caption.....	246
Figure 3-34. Station clustering dendrogram and percent species mean coincidence table for neuston plankton tows, November 4, 2004. Interpretation details are provided in the Figure 3-27 caption.....	247

LIST OF APPENDICES

CHAPTER 2

Appendix A-1. Forward step-wise multiple linear regression detailed summary statistics for each significant holoplankton taxa on April 24, 2000. Non-significant variables were omitted. All variables were regressed against (1) surface temperature, (2) 0.5 km horizontal change in surface temperature centered on each station, and (3) distance from shore.....	113
Appendix A-2. Forward step-wise multiple linear regression detailed summary statistics for each significant meroplankton taxa on April 24, 2000. Non-significant variables were omitted. All variables were regressed against (1) surface temperature, (2) 0.5 km horizontal change in surface temperature centered on each station, and (3) distance from shore.....	114
Appendix B-1. Forward step-wise multiple linear regression detailed summary statistics for each significant holoplankton taxa, and sample volume, on August 23 and 24, 2000. Non-significant variables were omitted. All variables were regressed against (1) distance from shore, (2) surface temperature, (3) surface salinity, (4) surface density, (5) approximate thermocline depth, (6) temperature change in the upper 5 meters, (7) temperature change in the upper 12 meters, and (8) the natural log of 0.5 km horizontal change in surface temperature centered on each station.....	115
Appendix B-2. Forward step-wise multiple linear regression detailed summary statistics for each significant meroplankton taxa, individuals per cubic meter, and total species, on August 23 and 24, 2000. Non-significant variables were omitted. All variables were regressed against (1) distance from shore, (2) surface temperature, (3) surface salinity, (4) surface density, (5) approximate thermocline depth, (6) temperature change in the upper 5 meters, (7) temperature change in the upper 12 meters, and (8) the natural log of 0.5 km horizontal change in surface temperature centered on each station.....	116
Appendix C. Pearson correlation results for significant MLR taxa collected on April 24, 2000. N=8, with a case-wise deletion of missing data, with red marked correlations significant at $p<0.050$	117
Appendix D-1. Pearson correlation results for significant MLR taxa collected on August 23-24, 2000. N=18, with a case-wise deletion of missing data, with red marked correlations significant at $p<0.050$	118
Appendix D-2. Pearson correlation results for significant MLR taxa collected on August 23-24, 2000. N=18, with a case-wise deletion of missing data, with red marked correlations significant at $p<0.050$. Data from transect 2 were not included.....	119
Appendix E. Species list and numbers of individuals per cubic meter by station. April 24, 2000.....	120
Appendix F. Species list and numbers of individuals per cubic meter by station. August 23-24, 2000.....	122

CHAPTER 3

Appendix A-1. Drogue data from May 7, 2002, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	249
Appendix A-2. Drogue data from July 15, 2003, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	251
Appendix A-3. Drogue data from July 17, 2003, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	252
Appendix A-4. Drogue data from February 21, 2004, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	253
Appendix A-5. Drogue data from September 27, 2004, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	255
Appendix A-6. Drogue data from November 4, 2004, including time and position. From this, distance and vector data were calculated and then split into onshore-offshore and alongshore components. The angle of the coastline along the study site was assumed to be straight and at an angle of -28.5° from true north.....	257
Appendix B-1. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, vertical plankton tows, May 7, 2002.....	258
Appendix B-2. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, vertical plankton tows, July 15, 2003.....	261
Appendix B-3. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, vertical plankton tows, July 17, 2003.....	264
Appendix B-4. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, neuston tows, February 21, 2004.....	268

Appendix B-5. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, vertical plankton tows, September 27, 2004.....	270
Appendix B-6. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, neuston tows, November 4, 2004.....	273
Appendix B-7. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, vertical plankton tows, September 27, 2004.....	275
Appendix B-8. Species list and individuals per cubic meter by station. All organisms were identified to the lowest reasonable taxonomic level. Station summaries are provided below the species list. Santa Monica Bay Nearshore Zone, neuston tows, November 4, 2004.....	278
Appendix C-1. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from May 7, 2002 vertical plankton tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, (6) thermocline depth, (7) temperature change in the upper 12m, and (8) 0.5 km horizontal change in surface temperature centered on each station.....	280
Appendix C-2. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the remaining abundance and significant plankton sample summaries from July 15, 2003 vertical plankton tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, (6) thermocline depth, (7) temperature change in the upper 12m, and (8) 0.5 km horizontal change in surface temperature centered on each station.....	283
Appendix C-3. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from July 17, 2003 vertical plankton tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, (6) thermocline depth, (7) temperature change in the upper 12m, and (8) 0.5 km horizontal change in surface temperature centered on each station.....	287
Appendix C-4. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from February 21, 2004 neuston tows. Non-significant variables were omitted. All variables were regressed	

against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, and (5) surface density.....	289
Appendix C-5. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from September 27, 2004 vertical plankton tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, (6) surface dissolved oxygen, (7) thermocline depth, (8) temperature and (9) chlorophyll concentration change in the upper 12m, and (10) change in surface temperature in a 0.5km distance centered on each station.....	291
Appendix C-6. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from September 27, 2004 neuston tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, and (6) surface chlorophyll concentration.....	295
Appendix C-7. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from November 4, 2004 vertical plankton tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, (6) surface dissolved oxygen, (7) thermocline depth, (8) temperature and (9) chlorophyll concentration change in the upper 12m, and (10) change in surface temperature in a 0.5km distance centered on each station.....	297
Appendix C-8. Forward step-wise multiple linear regression detailed summary statistics for each taxa comprising greater than 0.25% of the overall abundance and significant plankton sample summaries from November 4, 2004 neuston tows. Non-significant variables were omitted. All variables were regressed against (1) depth, (2) distance from shore, (3) surface temperature, (4) surface salinity, (5) surface density, and (6) surface chlorophyll concentration.....	302

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VITA

June 9, 1972	Born – Harbor City, California, USA
1994	B.A., Zoology, with distinction University of California Santa Barbara, California
1994 – 1995	Divemaster Bubbles Below Scuba Charters, Inc. Kapa'a, Kauai, Hawaii
1995	Field Technician University of California Santa Barbara, California
1995 – 1997	M.Sc., Entomology Oregon State University Corvallis, Oregon
1997 – present	Staff Scientist MBC Applied Environmental Sciences Costa Mesa, California
2000-2001	Teaching/Research Assistant University of California, Los Angeles Los Angeles, California
2001-2003	Teaching/Research Associate University of California, Los Angeles Los Angeles, California
2003-2006	Research Fellow University of California, Los Angeles Los Angeles, California

PUBLICATIONS AND PRESENTATIONS

- Morris, A.K., 2006, Macrozooplankton Assemblages in California Fronts, Coastal Environmental Quality Initiative, Paper 034. <http://repositories.cdlib.org/ucmarine/ceqi/034>
- November 2004 – Western Society of Naturalists, Rhonert Park, California – "Caught On Video! Jellyfish Aggregations Along The Monterey Upwelling Shadow, Monterey, California"
- August 2004 – Southern California Association of Marine Invertebrate Taxonomists, Los Angeles, California – "Oceanic Fronts: The Great Meeting Place"
- June 2004 – American Society of Limnology and Oceanography, Savannah, Georgia – "Caught On Video! Jellyfish Aggregations Along The Monterey Upwelling Shadow, Monterey, California"
- March 2004 – American Academy of Underwater Sciences, Long Beach, California – "Swimming Through Space – Measuring Macrozooplankton Densities Along Blue Water Diving Transects"
- September 2002 – Marine Science Center, Marine Science Teaching Colloquium, Dana Point, California – "Thirty Years of Environmental Monitoring in Long Beach Harbor – For Better or For Worse?"
- April 2000, 2001 – Department of OBEE, Biology of Invertebrates (105), UCLA, "Trematodes Impacting the World Around Us"
- May 1997 – Department of Entomology, Oregon State University, Masters Thesis Presentation, "Trophic Evolutionary Pathways: I eat, therefore I am".
- March 1997 – Eleventh Annual Biology Graduate Student Symposium, Hatfield Marine Science Center, Newport, Oregon – "Trophic Evolutionary Pathways, a Model Based On Malthusian Parameters".
- Morris, A.K., 1997, A Model of Trophic Evolutionary Pathways, MSc Thesis, Oregon State University, 147pp.
- March 1996 – Tenth Annual Biology Graduate Student Symposium, Hatfield Marine Science Center, Newport, Oregon: "Parasites that modify host behavior".

February 1996 – 1995-96 Winter Graduate Seminar Series, Oregon State University: "A Classification of Trophic Strategies Based On Malthusian Parameters".

December 1996 – Ent. 591, Biology of the Acari, Oregon State University: "Evolution of Parasitism in the Acari".

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January 1995 – College of Creative Studies Biology Colloquium, University of California at Santa Barbara: "Parasites and Their Affect on Fish Behavior".

June 1994 – American Society of Ichthyologists and Herpetologists, University of Southern California and Natural History Museum of Los Angeles County: "Effects of the Trematode *Euhaplorchis californiensis* on the Behavior of the Estuarine Killifish *Fundulus parvipinnis*".

ABSTRACT OF THE DISSERTATION

Zooplankton Aggregations in California Coastal Zones

by

Aaron Kimo Morris

Doctor of Philosophy in Biology

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Professor William M. Hamner, Chair

The accumulation of zooplankton at fronts has been known to science for centuries, however zooplankton behavior is generally under-appreciated as a factor contributing to the observed aggregation. I observed distributional patterns of various zooplankton species near the Monterey Bay upwelling shadow front and in the nearshore zone of Santa Monica Bay, California, in an effort to estimate the extent to which behavior determines horizontal distributions near fronts.

Using high-definition digital video on a remotely operated vehicle, I quantified the distribution and swimming orientation of sea nettles near the Monterey front. Sea nettles were highly aggregated on the front, and were more abundant on the warmer northern side of the front compared to the colder southern side. Regardless of proximity,

sea nettle swimming orientation was generally directed towards the front, implying that the frontal aggregation was due in part to swimming behavior.

Zooplankton and water property data were gathered along three transects crossing the Monterey front. The distribution of fish and invertebrate eggs, which were passive tracers, revealed that the front was strongly convergent on two transects, but exhibited transverse shear flow along the third transect where eggs skewed away from the front. Despite differences in flow patterns along the transects, zooplankton aggregations always occurred along the front. Thus, at least at the transverse shear front, behavior must account for some of the distributional bias on the front.

A characterization of the nearshore zone off Dockweiler State Beach, Santa Monica Bay, was made using shipboard and in-water sampling of water properties and zooplankton net tows. A conspicuous difference in flow patterns was revealed between water shoreward of the 10-20m isobath, where water moved alongshore with a tidal periodicity and no net directional flow, and that offshore, where water traveled alongshore in one direction over time. The observed separation of inner and outer waters was corroborated by data on plankton species distributions. Most species were skewed in either the onshore or offshore direction, suggesting that species are generally confined to the water mass of their respective sources, and that there could be a reduction in onshore-offshore mixing between the 10-20m isobath.