Status of the European Green Crab (*Carcinus maenas*) in California Estuaries

Progress Report
1/1/06-6/30/06

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Summary of Activities

Introduction

During the past several years, this collaborative project supported by the Pacific States Marine Fisheries Commission has aimed to monitor the abundance, distribution and potential spread of the introduced European green crab *Carcinus maenas* along the west coast United States. Our responsibility in this collaboration has been to gather, analyze and synthesize data for the State of California. Now with additional funding from both the PSMFC as well as NOAA, the scope of our project has expanded to include a green crab eradication project conducted in Bodega Bay. So this report, which covers project progress from January 1 to June 30, 2006 reflects both the monitoring goals as well as some of the initial phases of the eradication program. Although the efforts to get the eradication program underway have had consequences for the monitoring efforts, the details of the eradication program are summarized in the report to PSMFC by Catherine deRivera. This report will only summarize the status of the monitoring program in California. This information from this year is compared with catch per unit effort data from prior years to underline longer term trends that are now emerging from these data. Our data, together with similarly collected data from Oregon and Washington collected by collaborators, will contribute also to a broader picture of the status of green crabs along the Pacific. Together this broader monitoring project and the targeted eradication in Bodega Harbor will help further the management goals for the European green crab outlined in the Federal Green Crab Management Plan.

The present report summarizes most (but not all) of the data for California for 2006. Contained within are summaries of trapping data that measure the abundance and distribution of *Carcinus maenas* at many same locations in California as we have reported in previous years. These data allow the calculation of a catch per unit effort (CPUE) to compare trends over time in populations data both within and among sites. As with other recent reports, the trapping methods will not be repeated here, since they have been outlined in detail in earlier reports.

Included in this report are survey data for Tomales Bay, I discuss the results of the survey effort for this year in California. This is largely completed, although we may also get some data for Morro Bay, although I feel this may be funding poorly spent, since there have been no reports from there for six years. I summarize the major findings for each bay, but will reserve conclusions about the final trends until we have all the data for this year. These conclusions will be developed included in the final report at the end of this calendar year, which will provide sufficient time for a full analysis. I will also compare the trends over the last two years with changes observed during the initial phases of the invasion. Finally, I include a budget for the current reporting period 1/1/04-6/30/04 and a discussion of how funds were spent.

Results from Summer Surveys (currently in process)

Elkhorn Slough. Our data from the four sites trapped this year show that overall the CPUE is lower than last year. With the exception of one site, Kirby Park, which is similar to last year and always among our highest densities, the CPUE this year is almost 5 to 10 fold lower than last year. Record freshwater runoff this winter may have lowered this year's recruitment or may reduce abundances in the upper bay.

Tomales Bay. Also with the exception of one site, Miller Park, the results here are much lower than last year. Even the highest site this year is much lower than the highest last year, Shell Beach, which was nearly 100 fold higher last year than this year. Other data suggest that the extensive rains and long period of freshwater inflow has reduced densities at sites like this in the upper bay.

Bodega Bay. This site, in contrast to Tomales and Elkhorn, shows a significant increase in abundance over last year. There is nearly a 10 fold increase at the lower abundance sites and a five fold increase at Cheney Creek (also listed as Doran Park), which is the site with the highest abundance. Significantly, Bodega Harbor has by far the smallest freshwater input and typically has a salinity profile much more similar to ocean surface waters. The record freshwater runoff which may have persisted for weeks to months at the other sites is very short-lived in Bodega Harbor.

San Francisco Bay. Results from this site are in progress and will be included in the followup report.

Humboldt Bay. Results from this site are in progress and will be included in the followup report.

Morro Bay. No data will be collected from this site. No green crabs have been caught here since one crab found in 1998.

Analyses in Progress

Analysis of long-term trends both within and among bays will be completed and included with the winter report. This analysis will allow comparisons of the CPUE data for a five year period from 2002-2006 across the major bays and estuaries in California to understand longer term trends in green crab abundance. We can also compare these data with more limited data from a few sites (particularly Bodega Harbor) beginning in the mid-1990s. We will also be able to compare these data with eradication efforts in Bodega Bay to determine the efficiency of the trapping efforts there.

There may also be an opportunity to combine data from other states to examine coastwide trends in green crab data to determine the patterns of association between trends in California with those in the Pacific Northwest. It is predicted that oceanographic conditions may not operate similarly across the geographic range and the degree to which patterns of green crab abundance do or do not reflect this distinction would provide an important tool for predicting future spread or outbreak events for green crabs.

Site Name	Latitude	Longitude	Date	Trap Days	Carcinus	Carcinus CPUE
Elkhorn Slough						
Kirby Park	36.84103	########	7/11-713/06	20	90	4.50
Azevedo Pond	36.84573	########	7/11-713/06	20	13	0.65
Whistle Stop Lagoon	36.82397	########	7/11-713/06	20	4	0.20
North Marsh	36.83463	########	7/11-713/06	20	18	0.90
Tomales Bay						
Miller Park	38.20143	########	7/11-713/06	30	1	0.03
Marshall	38.15012	########	7/11-713/06	30	100	3.33
Tomasini North	38.12795	########	7/11-713/06	30	1	0.03
Shell Beach	38.11606	########	7/11-713/06	30	9	0.30
Bodega Bay						
Owl Channel	38.30937	########	7/11-713/06	30	55	1.83
Reserve Channel	38.31322	########	7/11-713/06	30	57	1.90
Dorm Channel	38.31713	########	7/11-713/06	30	61	2.03
Cheney Creek	38.31553	########	7/11-713/06	30	300	10.00
San Francisco Bay						
data in progress						
Bolinas Lagoon						
data in progress						
Humboldt Bay						
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