

**Contract #:** 03-285-559-0  
**Performance Period:** October 2004 to December 2007  
**Watershed:** Agua Hedionda  
**Funding Source:** EPA 319h Water Quality Implementation Project Grant,  
US EPA Assistance Agreement No. C9-9768201-0  
**PROJECT COST: \$500, 000**

## **Eradication and Surveillance of *Caulerpa taxifolia* within Agua Hedionda Lagoon, Carlsbad, California**

**319h GRANT FINAL REPORT  
February 18, 2008**

*Prepared by:*

Craig Elliott, Agua Hedionda Lagoon Foundation  
Rachel Woodfield, Merkel & Associates, Inc.

**CONTRACT SUMMARY**

This information will be made available to the public on the State Water Resources Control Board's (SWRCB) Website (see address below).

Use the "tab" and arrow keys to move through the form. If field is not applicable, please put N/A in block.

**Date filled out:** 01/10/2005

|  |  |
|--|--|
| <b>A) Contract Information</b> Please use complete phrases/sentences. Fields will expand as necessary as you type.   |  |
| <b>1. Contract Number:</b> 03-285-559-0  |  |
| <b>2. Project Title:</b> Eradication of <i>Caulerpa taxifolia</i> in Agua Hedionda Lagoon.   |  |
| <b>3. Project Purpose – Problem:</b> (problem being addressed) <i>Infestation of Caulerpa taxifolia, a non-native, intrusive alga.</i>   |  |
| <b>4. Project Goals:</b>   |  |
| <b>a. Short-term Goals:</b> <i>Complete eradication of Caulerpa taxifolia from Agua Hedionda Lagoon.</i>   |  |
| <b>b. Long-term Goals:</b> <i>Prevention of new infestations by public outreach and education.</i>   |  |
| <b>5. Project Location:</b> (lat/longs, watershed, etc.) <i>Agua Hedionda Lagoon in Carlsbad, California</i>   |  |
| <b>a. Physical Size of Project:</b> (miles, acres, sq. ft., etc.) <i>~275 acres</i>  | <b>b. Counties</b> included in the project: <i>San Diego</i> |
| <b>c. Legislative Districts:</b> (Assembly and Senate) <i>AD 74 &amp; SD38</i>   |  |
| <b>6. Which SWRCB program is funding this contract?</b> Please put an "X" by the one that applies.<br><input type="checkbox"/> Prop 13 <input checked="" type="checkbox"/> EPA 319(h) <input type="checkbox"/> Other |  |
| <b>B) Contract Contact:</b> Refers to contract project director.   |  |
| <b>Name:</b> <i>Craig T Elliott</i>  | <b>Job Title:</b> <i>Caulerpa Project Manager</i>            |
| <b>Organization:</b> <i>Agua Hedionda Lagoon Association</i>   | <b>Webpage Address:</b> <i>www.aguahedionda.org</i>          |
| <b>Address:</b> <i>1580 Cannon Road, Carlsbad, CA 92008</i>  |  |
| <b>Phone:</b> <i>760-434-2610</i>  | <b>Fax number:</b> <i>N/A</i>                                |
| <b>Email:</b> <i>celliot@alumni.caltech.edu</i>  |  |
| <b>C. Contract Time Frame:</b> Refers to the implementation period of the contract.  |  |
| <b>From:</b> <i>10/01/2004</i>   | <b>To:</b> <i>10/10/2007</i>                                 |
| <b>D) Project Partner Information:</b> Name all agencies/groups involved with project. <i>RWQCB, CDFG, NOAA, USDA</i>  |  |
| <b>E) Nutrient and Sediment Load Reduction Projection (if applicable):</b>   |  |
|  |  |

PLEASE PROVIDE A HARD COPY AND AN ELECTRONIC COPY TO YOUR CONTRACT MANAGER AND YOUR PROGRAM ANALYST WITH YOUR QUARTERLY/MONTHLY REPORT. ALL APPLICABLE FIELDS ARE MANDATORY. IF FIELD IS NOT APPLICABLE, PLEASE PUT N/A IN BLOCK. INCOMPLETE FORMS WILL BE RETURNED. THE ELECTRONIC VERSION OF THIS FORM CAN BE FOUND AT:  
<http://www.swrcb.ca.gov/nps/319hproj.html>.

## TABLE OF CONTENTS

|   |    |
|---|----|
| Executive Summary .....                           | 2  |
| Problem Statement and Relevant Issues .....       | 3  |
| Project Goals.....                                | 3  |
| Project Description.....                          | 3  |
| <u>Task 1. Project Administration</u> .....       | 4  |
| <u>Task 2. CEQA Documents and Permits</u> .....   | 7  |
| <u>Task 3. Surveillance and Eradication</u> ..... | 8  |
| <u>Task 4. Outreach and Education</u> .....       | 9  |
| Phase 1.....                                      | 10 |
| Phase 2.....                                      | 12 |
| Phase 3.....                                      | 12 |
| Phase 4.....                                      | 17 |
| Public Outreach.....                              | 30 |
| Conclusions.....                                  | 30 |
| Upcoming Work.....                                | 31 |
| Lessons Learned.....                              | 31 |
| List of Deliverables.....                         | 32 |
| Appendix.....                                     | 36 |

# **Eradication and Surveillance of *Caulerpa taxifolia* within Agua Hedionda Lagoon, Carlsbad, California 319h Grant Final Report**

**October 2004 to December 2007**

## **EXECUTIVE SUMMARY**

On June 12, 2000 the first known infestation in the Western Hemisphere of the invasive strain of the tropical marine alga, *Caulerpa taxifolia*, was discovered in Agua Hedionda Lagoon, in Carlsbad, California. The Southern California *Caulerpa* Action Team (SCCAT), a broad-based task force assembled from federal and state resource and regulatory agencies, exotic species experts, and marine resource scientists, immediately undertook an eradication effort. This document reports the results of eradication efforts undertaken at Agua Hedionda Lagoon by the SCCAT from the time period October 2004 to December 2007 using funding provided by EPA 319h Water Quality Implementation Project Grant, US EPA Assistance Agreement No. C9-9768201-0, awarded to the Agua Hedionda Lagoon Foundation (AHLF). Merkel & Associates (M&A) was contracted to conduct the eradication work.

From the date of discovery (June 2000) until the end of the Summer 2001 survey, the eradication effort at Agua Hedionda Lagoon primarily involved the treatment of all detected *C. taxifolia*. The amount of *C. taxifolia* present in the lagoon at the time of discovery was estimated to be 1,047 m<sup>2</sup>. By the end of the second year of eradication efforts at Agua Hedionda Lagoon the amount of *C. taxifolia* discovered had been reduced to 0.4 m<sup>2</sup>. The last discovery of *C. taxifolia* at Agua Hedionda Lagoon was on September 11, 2002. No *C. taxifolia* was detected during repeated surveys during Years 3, 4, and 5, marking the completion of the follow-up surveillance work at Agua Hedionda Lagoon.

The sixth year of the program, conducted under this agreement, marked a turning point in the eradication program with the declaration by the California Department of Fish and Game on July 12, 2006 that *Caulerpa taxifolia* had been successfully eradicated from Agua Hedionda Lagoon (and from Huntington Harbour). This determination was based on the findings presented in the report prepared by Merkel & Associates entitled Final Report on Eradication of the Invasive Seaweed *Caulerpa taxifolia* from Agua Hedionda Lagoon and Huntington Harbour.

An outreach and education program was launched to prevent new introductions of *Caulerpa* species into the wild, and detect new infestations not yet discovered. Audience groups reached during this time period included saltwater aquarists, public aquariums, aquarium retailers, online retailers, aquarium maintenance providers, SCUBA divers, and environmental stewards. Outreach activities included extensive advertising in aquarist periodicals in print and on the Internet, distribution of fact sheets to aquarium retailers and hobbyists, presentations to aquarist clubs, attendance at aquarist trade shows, and distribution of informational materials to aquarium maintenance providers.

## **PROBLEM STATEMENT AND RELEVANT ISSUES**

The highly invasive Mediterranean strain of the tropical marine alga *Caulerpa taxifolia* was discovered in Agua Hedionda Lagoon, Carlsbad, California in June 2000 (Figure 1). Its discovery represented the first known occurrence of this strain within the Western Hemisphere and is believed to pose a major threat to coastal ecosystems and recreational and commercial uses dependent upon coastal resources. While the species was also identified at a second site in California (Huntington Harbour, Orange County), the Agua Hedionda Lagoon infestation is the larger of the two known infestations. It is likely that *C. taxifolia* had been in the lagoon for at least four years prior to its discovery. It is not known whether other infestations also exist elsewhere in the United States. The continued availability and use of this species by saltwater aquarists is cause for concern.

Since the discovery of *C. taxifolia* in Agua Hedionda Lagoon in June 2000, eradication, surveillance, public outreach efforts, eradication research, and legislative efforts have been initiated and are on-going. The primary goal of the SCCAT Steering Committee, comprised of representatives from the San Diego Regional Water Quality Control Board, California Department of Fish and Game, National Oceanic and Atmospheric Administration National Marine Fisheries Service (Chair), Santa Ana Regional Water Quality Control Board, and U.S. Department of Agriculture-Agricultural Research Service, has been the eradication of the known infestations and prevention of new infestations through outreach and education.

The eradication program partially funded by this agreement was begun in June 2000. The present agreement and matching funds funded the continuation of the surveillance and mapping element of the Southern California *Caulerpa* Eradication Program at Agua Hedionda Lagoon (surveillance and mapping at Huntington Harbour was funded by the Santa Ana Regional Water Quality Control Board) as well as the continuation of the Southern California *Caulerpa* Outreach and Education Program. The time period of October 2004 to December 2007 covered by this report was the fifth year of the eradication program, and the third year of surveillance that followed the last find of *C. taxifolia*, which had been detected in September 2002.

## **PROJECT GOALS**

The goal of this project was to continue ongoing efforts to eradicate *Caulerpa taxifolia* from Agua Hedionda Lagoon, and to prevent new infestations through development and implementation of an outreach and education program.

## **PROJECT DESCRIPTION**

The following section will discuss project methodologies and present data collected. The discussion will be broken down by project tasks as outlined in the list of Work to be Performed.

## **PROJECT HISTORY**

In early 2002, the AHLF applied for 319h Non-Point Source Implementation grant funds to conduct the work referenced above. The concept proposal, as PIN #910, was invited back for a complete review, and eventually awarded the full requested amount of \$500,000. An agreement, however, was not executed until July 2004. In October 2004, shortly after work commenced, the AHLF sought a contract modification to remove UC Cooperative Extensions as a listed sub-contractor. The Regional Board approved Modification #1 by letter dated October 20, 2004. No

other amendments or modifications have been requested or made during the life of this agreement.

**Task 1. Project Administration**

1.1. *Technical and Administrative Services*

Under this task, AHLF provided all technical and administrative services as needed for Agreement completion, review of work performed, preparation of progress reports, and coordination of budgeting and scheduling. Copies of all invoices to SWRCB from AHLF, as well as subconsultant invoice to AHLF are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.1 Administrative Documents, and are summarized in the table below:

**Table 1.**

| Deliverable title        | Date Submitted |
|--------------------------|----------------|
| Inv # 1 SWRCB 050125.doc | 1/25/05        |
| Inv # 2 SWRCB 050425.doc | 4/25/05        |
| Inv # 3 SWRCB 050712.doc | 7/12/05        |
| Inv # 4 SWRCB 051103.doc | 11/03/05       |
| Inv # 5 SWRCB 060118.doc | 1/18/06        |
| Inv # 6 SWRCB 070531.doc | 5/31/07        |
| Inv # 7 SWRCB 070720.doc | 7/20/07        |
| Inv # 8 SWRCB 071017.doc | 10/17/07       |
| Inv # 9 SWRCB 071231.doc | 1/3/08         |

The proposed project was completed as originally proposed, without time extensions, within budget, and in accordance with approved procedures, and applicable laws and regulations.

1.2. *Quarterly Progress Reports*

Under this task, a total of thirteen progress reports were prepared describing the activities undertaken and accomplishments of each task during the quarter. Copies of all progress reports are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.2 Quarterly Progress Reports, and are summarized in the table below:

**Table 2.**

| Deliverable title          | Due Date | Date Submitted |
|----------------------------|----------|----------------|
| Progress Report #1         | 1/10/05  | 1/10/05        |
| Progress Report #1 revised |          | 1/25/05        |
| Progress Report #2         | 4/10/05  | 4/11/05        |
| Progress Report #3         | 7/10/05  | 7/11/05        |
| Progress Report #3 revised |          | 7/29/05        |
| Progress Report #4         | 10/10/05 | 10/11/05       |
| Progress Report #5         | 1/10/06  | 1/12/06        |
| Progress Report #5 revised |          | 1/19/06        |
| Progress Report #6         | 4/10/06  | 4/7/06         |
| Progress Report #7         | 7/10/06  | 7/11/06        |
| Progress Report #8         | 10/10/06 | 10/11/06       |

|                     |          |          |
|---------------------|----------|----------|
| Progress Report #9  | 1/10/07  | 1/16/07  |
| Progress Report #10 | 4/10/07  | 4/12/07  |
| Progress Report #11 | 7/10/07  | 7/11/07  |
| Progress Report #12 | 10/10/07 | 10/11/07 |
| Progress Report #13 | 1/10/08  | 2/18/08  |

1.3. *Federal Disclosure Requirements*

All documents and reports prepared pursuant to this agreement included the following disclosure statement.

*Funding for this project has been provided in part by the U.S. EPA pursuant to Assistance Agreement No. C9-9768201-0 and any amendments thereto which has been awarded to the State Water Resources Control Board (SWRCB) for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the USEPA or the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.*

Subcontractor Merkel & Associates included this statement on all deliverables prepared with funds from this agreement, as well as ensuring that materials produced with assistance from other vendors included it as well.

1.4. *Contract Manager Notification*

The Contract Manager, State and Regional Board members, and staff were all notified at least 10 working days in advance of a public event that was held on July 12, 2006 to announce and publicize the eradication of *Caulerpa taxifolia* from Agua Hedionda Lagoon. The Contract Manager, and other Regional Board staff (Regions 8 & 9) attended the event. No other public or media events warranted notification pursuant to this agreement.

1.5. *Contract Summary Form*

The Contract Summary Form was completed and submitted on January 25, 2005. A copy of this form follows the cover page of this document and is also included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.5 Contract Summary Form.

1.6. *Minority and Women-owned Business Enterprise Participation*

Task 1.6.1 Project tasks that shall be subcontracted

Portions of Task 1 – Project Administration (task 1.2 specifically), and all of Task 3- Surveillance and Eradication, Task 4 - Outreach and Education, and Task 5 – Draft and Final Project Reports were identified as tasks to be subcontracted.

**Task 1.6.2 Participation Forms**

Participation Forms were submitted as indicated on the Participation Guide’s checklist on a quarterly basis as a deliverable attachment to the quarterly progress report. Submittals are summarized in the table below:

**Table 3.**

| Deliverable title                    | Due Date | Date Submitted |
|--------------------------------------|----------|----------------|
| MBE/WBE Forms in Progress Report #1  | 1/10/05  | 1/10/05        |
| MBE/WBE Forms in Progress Report #1  |          | 1/25/05        |
| MBE/WBE Forms in Progress Report #2  | 4/10/05  | 4/11/05        |
| MBE/WBE Forms in Progress Report #3  | 7/10/05  | 7/11/05        |
| MBE/WBE Forms in Progress Report #3  |          | 7/29/05        |
| MBE/WBE Forms in Progress Report #4  | 10/10/05 | 10/11/05       |
| MBE/WBE Forms in Progress Report #5  | 1/10/06  | 1/12/06        |
| MBE/WBE Forms in Progress Report #5  |          | 1/19/06        |
| MBE/WBE Forms in Progress Report #6  | 4/10/06  | 4/7/06         |
| MBE/WBE Forms in Progress Report #7  | 7/10/06  | 7/11/06        |
| MBE/WBE Forms in Progress Report #8  | 10/10/06 | 10/11/06       |
| MBE/WBE Forms in Progress Report #9  | 1/10/07  | 1/16/07        |
| MBE/WBE Forms in Progress Report #10 | 4/10/07  | 4/12/07        |
| MBE/WBE Forms in Progress Report #11 | 7/10/07  | 7/11/07        |
| MBE/WBE Forms in Progress Report #12 | 10/10/07 | 10/11/07       |
| MBE/WBE Forms in Progress Report #13 | 1/10/08  | 2/18/08        |

**Task 1.6.3 Participation Report Forms**

Participation Reporting Forms documenting actual participation on a quarterly basis were submitted as indicated in the SWRCB’s Participation Guide as a deliverable attachment to the quarterly progress report, as summarized in the table above.

**Task 1.6.4 Affirmative Steps in Procurement and Subcontracting**

Procurement and subcontracting for this project applied affirmative steps outlined in Exhibit E. Procurement policies for the Grantee (AHLF) and Subcontractor Merkel & Associates are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.6.4 Procurement Policies.

**1.7. Subcontractor Agreements**

Subcontracts were awarded for tasks described in item 1.6.1 above. Merkel & Associates (a woman-owned small business) was contracted to perform portions or all of Tasks 1-5. Katz & Associates (a woman-owned business) and KTU+A (a small business) were subcontracted by Merkel & Associates to provide services under Task 4 (Outreach and Education). Copies of the subconsultant agreements are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.7 Subcontractor Agreements.

**1.8. NRPI Project Survey Form**

At the completion of the project, a Natural Resources Project Inventory project survey form was completed on-line on December 31, 2007. A print-out of the completed form is included in the

Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 1.8 NRPI Project Survey Form.

## **Task 2. CEQA Documents and Permits**

### 2.1. *CEQA Documentation*

A Notice of Exemption for the work in Agua Hedionda Lagoon was filed with the State and County of San Diego on December 6, 2000 and was submitted to the Contract Manager on January 25, 2005. A Notice of Exemption for the work in Huntington Harbour was filed with the State and County of Orange on December 21, 2000 and was submitted to the Contract Manager on January 25, 2005. Copies of these documents are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 2.1 CEQA Documentation.

### 2.2. *Project Permits*

The following permits were issued to conduct the project work:

- A Hold Notice was issued for Agua Hedionda Lagoon by the California Department of Food and Agriculture of July 7, 2000. The signed notice is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 2.2 Permit Coversheets.
- The U.S. Army Corps of Engineers authorized the use of Nationwide Permit Number 27 for *Caulerpa taxifolia* eradication activities on October 12, 2000. The signed authorization is also included in the Compendium of Results and Deliverables CD.
- The California Coastal Commission concurred with the Consistency Determination No. CD-051-02 for National Marine Fisheries Service on December 12, 2002. The signed concurrence is also included in the Compendium of Results and Deliverables CD.
- A Special Local Need Registration was issued by the Department of Pesticide Regulation to Merkel & Associates on May 14, 2003, for use of chlorine tablets in lagoons to treat *Caulerpa taxifolia*. is also included in the Compendium of Results and Deliverables CD.
- This project did not involved placement of fill, therefore a Section 401 certification was not needed

Copies of these permits were submitted to the Contract Manger on January 25, 2005.

### **Task 3. Surveillance and Eradication**

#### 3.1. Survey and Treatment

##### Task 3.1.1 Survey Protocol

The protocol for conducting surveys for *Caulerpa taxifolia* was approved by the SCCAT Steering Committee in November 2001 and was submitted to the Contract Manager on January 25, 2005, and is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.1.1 Survey Protocol.

##### Task 3.1.2 Quality Assurance/Quality Control Report

The QA/QC protocol for conducting surveys for *Caulerpa taxifolia* was approved by the SCCAT Steering Committee and Contract Manager on January 23, 2005 and was submitted to the Contract Manager on January 25, 2005, and is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.1.2 QA/QC Report.



As fewer and smaller occurrences of *C. taxifolia* were being discovered during the eradication effort, a program was developed to assess the survey dive team's ability to locate *C. taxifolia* in the often murky water of the infestation sites. Patches of artificial *Caulerpa* of various small sizes were randomly placed at Agua Hedionda Lagoon (and Huntington Harbour, not covered in this report) during each of the regular surveys to test the dive team. Surveys were conducted in accordance with the approved QA/QC Protocol. Confidence in the results of each survey for live *C. taxifolia* could then be quantitatively estimated based on the proportionate amount of known quantities of artificial *Caulerpa* found by the divers. The results of the consecutive assessments of the efficacy of the surveys ultimately allowed for an estimation of the eradication certainty that all real *C. taxifolia* existing at the two sites had been found and that eradication had been achieved.

Based on the results of survey efficacy assessments conducted since fall 2002, it was determined that there is a 97.71% certainty that eradication was achieved at Agua Hedionda Lagoon, assuming the worst level of detection during each survey, and a 99.86% certainty if the average detection levels are assumed.

The survey efficacy assessment also determined that the smallest patch size of artificial *Caulerpa* that could be found with greater than 99% efficiency was 1-m wide; smaller sizes were found with less frequency. Based on the growth rates of the aquarium strain of *C. taxifolia* measured at Agua Hedionda Lagoon and other sites, it is assumed that any undetected patches of *C. taxifolia* would have grown to at least 1 meter in diameter within two years. Seven repeated surveys of Agua Hedionda Lagoon were conducted over more than a three-year period with no *C. taxifolia* detected.

The results of these quality assurance assessments of the survey technique were written up in the document *Southern California Caulerpa taxifolia Eradication Program - Caulerpa taxifolia Survey Efficacy Assessment at Agua Hedionda Lagoon and Huntington Harbour* dated February

2005. This report was not a deliverable for this task and has not been previously submitted, but is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.1.2 QA/QC Report.

### Task 3.1.3 Surveys

The eradication program partially funded by this agreement was begun in June 2000. The present agreement and matching funds funded the continuation of the surveillance and mapping element of the Southern California *Caulerpa* Eradication Program at Agua Hedionda Lagoon (surveillance and mapping at Huntington Harbour was funded by the Santa Ana Regional Water Quality Control Board). The time period of October 2004 to December 2007 covered by this report was the fifth year of the eradication program and the third year of surveillance that followed the last find of *C. taxifolia*, which had been detected in September 2002.

The SCCAT Technical Subcommittee had developed a timeline for declaration of eradication based on both the biology of *C. taxifolia* and the capabilities and efficacy of the survey team. The schedule involved conducting surveys for a minimum of two growing seasons (summer and fall) following the last find of *C. taxifolia*. If no *C. taxifolia* were found during each consecutive survey, surveys during the next season would be expected to find any patches previously missed, due to patch expansion facilitated by the favorable growing conditions that exist for much of the year in the lagoon. It was determined that once surveys were conducted over three full growing seasons with no *C. taxifolia* found, then eradication would be declared. This Agreement covered the last year and a half of these three years of additional surveys: Fall 2004, Summer 2005, and Fall 2005.



picked up the survey lines.

The surveys were conducted in accordance with the survey protocol, by systematically placing weighted transect lines on the lagoon bottom with the aid of dGPS. Divers following the transect line maintained a spacing between one another of one meter or less with the use of a marked guideline which was kept taut out to the side of the lead diver. The survey was designed to cover the entirety of the three basins of the lagoon. The survey team generally consisted of a team of 5-7 divers, a tending vessel to accompany and assist the dive team, and a survey vessel that laid and

The completion of the Fall 2005 survey marked the end of the follow-up surveillance for *Caulerpa* following the treatment of all known occurrences. AHLF contractor M&A presented the data on the status of the eradication and recommended that eradication be declared in the document entitled Final Report on Eradication of the Invasive Seaweed *Caulerpa taxifolia* from Agua Hedionda Lagoon and Huntington Harbour (submitted on July 11, 2006 and included under Task 3.3.3 below). The report found that the two criteria for successful eradication of the *C. taxifolia* infestations are 1) the containment and lethal treatment of *C. taxifolia* at the infestation site, and 2) verified absence of *C. taxifolia* from the infestation site. The data collected over the prior five years of the program indicated that these criteria had been met. As a

result, eradication of *C. taxifolia* from Agua Hedionda Lagoon was declared on July 12, 2006 by the California Department of Fish and Game.

Twenty-three months after the completion of the last survey, and following the removal of the treatment tarps, one additional survey of the previously infested and tarped areas was conducted in October and November 2007. No *C. taxifolia* was detected.

There is no deliverable for this task, however to illustrate the exhaustive coverage of the survey work, all transects that were surveyed by divers since the last discovery of *C. taxifolia* in September 2002 are presented in the figure below. Additionally, maps of the areas surveyed are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.3.2 Survey Maps and Photo Archive.



Transects surveyed for *Caulerpa taxifolia* since the last detection in September 2002  
Fall 2002, Winter 2002, Spring 2003, Summer 2003, Fall 2003, Summer 2004, Fall 2004, Summer 2005 and Fall 2005  
Agua Hedionda Lagoon, Carlsbad, CA



#### Task 3.1.4 *Caulerpa* detection

This task covered assessing and mapping the extent of any new infestations detected during this time period (10/04 to 12/07). Again, surveys were conducted in Fall 2004, Summer 2005, Fall 2005 and Fall 2007. No *Caulerpa* was detected during any surveys. The last find of *Caulerpa* at Agua Hedionda Lagoon was in September 2002.

#### Task 3.1.5 *Caulerpa* treatment

This task covered treatment of any new infestations detected during this time period. No *Caulerpa* was detected during any surveys and therefore no treatment was needed.

#### Task 3.1.6 Resurvey of new infestations

This task covered resurvey of any new infestations following treatment. No *Caulerpa* was detected during any surveys and therefore no treatment was needed.

#### Task 3.1.7 Treatment tarp removal

Under the direction of the SCCAT Steering Committee at the January 25, 2005 SCCAT Meeting, AHLF contractor M&A conducted a pilot treatment tarp removal program to assess the feasibility and cost of complete removal of the treatment tarps following successful eradication. Heavy winter rains delayed much of the field work, initiated in early 2005, and the resulting turbidity associated with the tremendous storm runoff complicated efforts to assess the amount of long-term turbidity generated by tarp removal activities. Additional study work was conducted in January 2006 to determine the feasibility of removing the gravel bags used to hold down the tarps as well.

The results of the field work at Agua Hedionda Lagoon suggested that it would be feasible to remove the tarps, however the deterioration of the tarps over time has caused them to be brittle in many cases, making removal time consuming. The turbidity generated by the removal of the tarps appeared to be short-term (returning to baseline levels within hours) and of a magnitude comparable to conditions commonly created by varying wind and tide stages. The turbidity observed during the weeks following the heavy winter storms was considerably higher and more persistent than that generated by the tarp removal trials.



The methodology testing involved first swimming the perimeter of each tarp to search for the gravel bags used to secure the tarps. As each bag was encountered, two techniques were tested: 1) cutting open the nylon bag underwater, dumping the gravel, and collecting the bag; and 2) collecting all of the bags into a basket to be winched to the surface, where a deckhand would cut open the bags, dump the gravel, and dispose of the bag. The trial demonstrated the work to be very labor intensive, and it was anticipated to require regular replacement of diver work gloves, collection bags, and dive knives.

After testing both methods it was determined that both techniques were equally efficient, however the first method required less mechanical assistance and was therefore less expensive and safer to conduct. Based on this work it was determined to be feasible to remove the gravel bags as well as the tarps.

Tarp removal was initiated in Fall 2006, following both the Eradication Declaration and the recreational high season. Matching funds to this Agreement were used for tarp removal activities in both Huntington Harbour and Agua Hedionda Lagoon Hedionda Lagoon, with Agreement funds used for work solely at Agua Hedionda Lagoon in Spring and Fall 2007. The removal program evolved over time, as work of this nature has not been done before and conditions encountered were highly variable. The removal work involved two teams: a gravel bag removal team and a tarp removal team.

At Huntington Harbour and Agua Hedionda Lagoon, the gravel bag team moved systematically over the tarps with guidance from GIS-based maps of the tarp positions, tarp placement field notes, dGPS positioned markers, and physical landmarks around the site. Prior to any gravel bag removal work, the divers surveyed their work areas for *Caulerpa taxifolia*. Then the methodology described above whereby divers opened the gravel bags underwater and collected the bags was implemented. A tender in the support vessel above recorded the number of bags removed by each diver and indicated areas that had been cleared. The bags were disposed of in a dumpster placed at the site.



The tarp removal team then followed with a much larger vessel specially rigged for this project with a metal frame that supported a spooling cable powered by a winch. Removal would involve a diver executing the following actions: 1) assessing the position and size of the tarp, 2) surveying the surface and boundary of the tarp for *C. taxifolia*, 3) cutting larger tarps into smaller pieces with a box cutter or dive knife, 4) sliding a heavy gauge steel bar under the center of the tarp, 5) cutting a hole in the center of the tarp to expose a loop welded to the steel bar, and 6) bringing down the cable

from the support boat and hooking it to the exposed loop on the bar. At that point the diver would move to the next tarp while the surface vessel would slowly use the winch to raise the cable. The tarp would be lifted off the bottom by the bar, much like a tablecloth draped on a coat hanger.

Once the tarp was successfully lifted from the water, it would be transported to the field station on shore and spread out on the beach. The tarp was measured to know exactly what areal extent had been removed, then cut into smaller pieces and placed in a large dumpster positioned at the site. Also collected was any rebar or rope associated with the tarping process.



Following removal of the gravel bags and the tarps, a technique was developed to assess the completion of the tarp removal in a given area. A team of divers was assembled to conduct a survey using methods similar to surveillance for *Caulerpa*, whereby a large number of divers are lined up and systematically search a given area. The divers were guided by transect lines placed by a boat using GPS coordinates derived from a GIS map of the tarped areas. The divers were each equipped with buoys to mark any missed tarps or gravel bags encountered during the survey. These areas were then revisited by the gravel bag and tarp removal crews to remove the remaining materials.

The progress of the gravel bag and tarp removal process was tracked using GIS, working off the map created of the tarp distribution as they were laid down from 2000-2002. The status of each tarp was tracked as either being Not Removed, Gravel Bags Removed Only, or Removed. This allowed for daily assessment of the progress of the removal efforts, generation of accurate field maps to direct work, and quick location of targeted tarps using GPS waypoints derived from the GIS database.

At the time of the preparation of this report, the tarp removal process Agua Hedionda Lagoon is approximately 88% complete. Removal of the more recently placed treatment tarps from the peripheral areas of the lagoon went very quickly, but removal of the older tarps from the Snug Harbor area, at the core site of the infestation, has been slowed considerably. These tarps have very thick layers of sediment on them that is composed of very dense clay particles. This layer is particularly thick at the edges of the tarp, with depths of over 30 cm in some places. The team methodologies are continuing to evolve as various conditions are presented. The tarp removal team has had to cut the tarps into smaller pieces and lift the tarps more slowly to avoid tearing of the tarp as it is pulled out from under the sediment layer. One important note is that the eelgrass, which typically inhabits this basin of the lagoon but was severely reduced in its extent by storms and red tide in past years, has not re-colonized the tarps to any great extent, with occasional shoots found on the tarp edges. Eelgrass is therefore not being displaced by the tarp removal efforts. It is anticipated that eelgrass will naturally recolonize the area from which the tarps have been removed in coming growth seasons.

Completion of the tarp removal will be funded by the State Water Resources Control Board through a Proposition 13 grant.

There is no deliverable for this task. A map of the tarp removal areas is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.1.7 Tarp Removal.

### 3.2. *Adaptive Management*

#### Task 3.2.1 Participate in SCCAT meetings

Under this task AHLF and its contractors attended all regularly scheduled SCCAT meetings (i.e. 13 in total, during the specified grant time period). AHLF Subcontractor Merkel & Associates (M&A) representatives presented the results of all eradication activities at regularly scheduled SCCAT meetings. During this time period, updates were provided to SCCAT on 10/1/04, 11/22/04, 1/25/05, 4/6/05, 6/4/05, 8/4/05, 10/4/05, 1/12/06, 4/6/06, 9/22/06, 1/16/07, 5/10/07, and 10/31/07. Copies of the presentations given at these meetings were delivered to the Contract Manager with each quarterly progress report and are also included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.2.1 SCCAT Surveillance and Eradication Updates.

AHLF and its contractor M&A also attended three special Steering Committee meetings to present data on specific issues and participate in the discussion of the topic. First was a special technical committee meeting on October 4, 2005 to discuss the criteria for eradication and plans for removing treatment tarps once eradication was achieved. A special Steering Committee meeting was held December 20, 2005 to discuss plans for an eradication declaration ceremony to be held in July 2006. M&A presented for discussion plans for media relations, guest invitations, program materials, and event logistics. On June 1, 2006 a brief special Steering Committee meeting was held and attended by AHLF and M&A to discuss final logistics for the eradication event the next month, as well as to host a public meeting that night presenting the status of the eradication program to interested stakeholders. This presentation is discussed in the following section. AHLF and M&A attended a special funding meeting held by the Steering Committee on March 6, 2007 to discuss funding strategies for the upcoming phases of the eradication program.

#### Task 3.2.2 Coordinate the stakeholders at Agua Hedionda Lagoon

AHLF's contracted survey team (M&A) used flagging and vessel lighting to clearly indicate the work area of the eradication team, as outlined in the Interim Management Plan, an agreement reached in 2002 between local residents, boaters, and other lagoon stakeholders. The work area was marked by large orange floats and a tending vessel accompanied the divers at all times for safety and diver support. Safety coordination with other lagoon users was facilitated through the guidelines of the Interim Management Plan, which involved posting the work schedule at all access points throughout the lagoon and keeping an informational phone line updated (760-439-1023) for boaters to call ahead to learn about access restrictions associated with survey and tarp removal work. The survey team worked in cooperation with the Carlsbad Lagoon Patrol when possible, though their presence at the lagoon was limited.



In April 2005, the SCCAT Steering Committee coordinated with the City of Carlsbad to extend the plan for another year, with a new expiration of June 30, 2006. The only remaining restriction was the prohibition of anchoring in the east basin, the limitation of fishing to the passive use area, and the closure of zones to facilitate eradication activities. The plan was extended for an additional year with SCCAT coordination in April 2006, with a new expiration of June 30, 2007. In May 2007, AHLF and M&A coordinated with the City to extend the plan for 6 months to expire on December 31, 2007. After that date the Interim Management Plan expired.

Updates to stakeholders were periodically held over the life of the project. During this reporting time period a community meeting was held at the Agua Hedionda Lagoon Foundation Discovery Center on June 1, 2006.

A copy of a typical lagoon schedule posting as well as a copy of the presentation made at the public meeting were submitted on January 25, 2005 and July 11, 2005, respectively, and are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.2.2 Community Presentations and Signs SCCAT Surveillance and Eradication Updates.

#### Task 3.2.3 Methodology Improvement

No changes to the eradication, survey, or QA/QC methodologies were undertaken during the time of this grant project. The key testing of methodologies involved the development and testing of various tarp removal techniques. The results of the tarp removal pilot study were presented to the SCCAT on April 6, 2005, and following the eradication declaration the Steering Committee gave direction to proceed with tarp removal at the September 22, 2006 SCCAT meeting. The methods tested, the results, and the approach determined to be most efficient and effect were described in detail above in section 3.1.7. There was no deliverable for this task.

#### Task 3.2.4 *Caulerpa* stock maintenance

Under this task AHLF contractor M&A maintained a stock of *C. taxifolia* collected from the two infestation sites in its culture facility equipped with closed-system aquaria, and according to conditions specified in CDFA and CDFG permits issued to Dr. Lars Anderson, USDA-ARS (Davis, CA). The *C. taxifolia* was propagated to generate an adequate supply for training and research purposes. By the end of 2004 there was little need for separate stocks of *C. taxifolia* and all stock was transferred to USDA-ARS.

### 3.3. *Data Collection, Management, and Analysis*

#### Task 3.3.1 Collect and organize all data from the eradication program

This task covered all aspects of data management and analysis. AHLF Contractor M&A continued to organize all data collected from all portions of the eradication program since its inception in 2000 to ensure that it was accurate, accessible, and backed up off-site. These data are stored in spatial and relational databases that allow for the timely generation of maps, charts, photos, reports, and presentation materials as needed. No additional records were made in relation to discoveries of *C. taxifolia* as none was found during this time period. Analyses of collected data for various aspects of the eradication program were presented at each SCCAT meeting and in each annual program report, which were submitted on April 11, 2005, April 7, 2006, and July 11, 2007 and have been included in the Compendium of Results and Deliverables CD attached to this document.

Task 3.3.2 Provide maps, charts, photos as needed

All data, including maps, charts, and photos were made available to the Contract Manager and SCCAT Steering Committee upon their request throughout the period of this Agreement. A photo archive of the work effort continued to be maintained for inclusion in reports, outreach activities, and presentations. A collage of photos documenting the eradication effort has been included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.3.2 Survey Maps and Photo Archive.

Task 3.3.3 Provide data to SCCAT on request

Inquiries from SCCAT Steering Committee members were responded to by AHLF contractor M&A by telephone or email, as needed.

SCCAT also requested that AHLF and its contractor M&A prepare a final document presenting the collected data on the status of the eradication and recommending that eradication be declared. This document was entitled Final Report on Eradication of the Invasive Seaweed *Caulerpa taxifolia* from Agua Hedionda Lagoon and Huntington Harbour, was submitted to the contract manager on July 11, 2006 and has been included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.3.3 Additional Data Requested.

Task 3.3.4 Record and Map Newly Discovered Infestations

This task required recording and mapping of any new infestations detected during this time period. No *Caulerpa* was detected during any surveys and therefore no such recording or mapping was necessary.

3.4. *Reporting*

Task 3.4.1 Email status reports

Under AHLF direction, subcontractor M&A sent out regular update reports by e-mail to the SCCAT Steering Committee and its designees. These reports described all eradication program activities conducted during the reporting period, including details of the areas surveyed and results, data collection activities, outreach work, document preparation, eradication declaration preparation and all other activities undertaken in relation of *C. taxifolia* at Huntington Harbour and Agua Hedionda Lagoon. These reports also highlighted any issues that had arisen and needed to be addressed by SCCAT. The reporting periods were generally the 1<sup>st</sup> through the 15<sup>th</sup> and the 16<sup>th</sup> through the end of each month. The e-mail status reports are summarized in the table below and included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.4.1 Email Updates. These reports also include updates on other eradication and surveillance activities funded by other sources and not reported on in this report.

**Table 4.**

| Reporting Period    | Date Submitted by Email |
|---------------------|-------------------------|
| 10/16/05 - 10/31/05 | 11/2/05                 |
| 11/1/05 - 11/15/05  | 11/17/05                |
| 11/16/05 – 11/30/05 | 12/7/05                 |
| 12/1/05 – 12/15/05  | 12/19/05                |
| 12/16/05 – 12/31/05 | 1/10/06                 |
| 1/1/06 – 1/31/06    | 2/8/06                  |
| 2/1/06 – 2/28/06    | 3/2/06                  |

|                     |          |
|---------------------|----------|
| 3/1/06 – 3/31/06    | 4/6/06   |
| 4/1/06 – 4/31/06    | 5/22/06  |
| 5/1/06 – 5/31/06    | 6/8/06   |
| 6/1/06 – 6/30/06    | 7/5/06   |
| 7/1/06 – 7/15/06    | 4/19/06  |
| 7/16/06 – 7/31/06   | 8/7/06   |
| 8/1/06 – 8/15/06    | 8/17/06  |
| 8/16-06 – 8/31/06   | 9/5/06   |
| 9/1/06 – 9/15/06    | 9/19/06  |
| 9/16/06 – 9/30/06   | 10/9/06  |
| 10/1/06 - 10/15/06  | 12/15/06 |
| 10/16/06 - 10/31/06 | 12/15/06 |
| 11/1/06 - 11/15/06  | 12/15/06 |
| 11/16/06 – 11/30/06 | 12/15/06 |
| 12/1/06 – 12/15/06  | 12/15/06 |
| 12/16/06 – 12/31/06 | 1/10/07  |
| 1/1/07 – 1/15/07    | 1/18/07  |
| 1/16/07 – 1/30/07   | 2/1/07   |
| 2/1/07 – 2/15/07    | 2/16/07  |
| 2/16/07 – 2/28/07   | 3/2/07   |
| 3/1/07 – 3/15/07    | 3/20/07  |
| 3/16/07 – 3/31/07   | 4/10/07  |
| 4/1/07 – 4/15/07    | 4/24/07  |
| 4/16/07 – 4/31/07   | 5/1/07   |
| 5/1/07 – 5/15/07    | 5/22/07  |
| 5/16/07 – 5/31/07   | 6/5/07   |
| 6/1/07 – 6/15/07    | 6/20/07  |
| 6/16/07 – 6/30/07   | 7/5/07   |
| 7/1/07 – 7/15/07    | 7/18/07  |
| 7/16/07 – 7/31/07   | 8/27/07  |
| 8/1/07 – 8/15/07    | 8/27/07  |
| 8/16-07 – 8/31/07   | 9/6/07   |
| 9/1/07 – 9/15/07    | 9/18/07  |
| 9/16/07 – 9/30/07   | 10/4/07  |
| 10/1/07 – 10/15/07  | 10/23/07 |
| 10/16/07 - 10/31/07 | 11/2/07  |
| 11/1/07 - 11/15/07  | 11/20/07 |
| 11/16/07 – 12/15/07 | 12/17/07 |
| 12/16/07 – 12/31/07 | 12/26/07 |

Task 3.4.2 Quarterly project reports

Under AHLF direction, subcontractor M&A prepared quarterly project reports on survey efforts, including a summary of the surveillance work, results, and actions taken, including photos and figures. The results of any additional work assigned by the Steering Committee were included. These reports were designed to be stand-alone documents and therefore have a repetitive introduction. The quarterly status reports were submitted the Contract Manager quarterly, as

summarized in the table below, and are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.4.2 Quarterly Reports.

**Table 5.**

| Deliverable title            | Due Date | Date Submitted |
|------------------------------|----------|----------------|
| Progress Report Oct-Dec 04   | 1/10/05  | 1/25/05        |
| Progress Report Jan-Mar05    | 4/10/05  | 4/11/05        |
| Progress Report Apr-Jun05    | 7/10/05  | 7/14/05        |
| Progress Report Jul-Sept05   | 10/10/05 | 10/11/05       |
| Progress Report Oct-Dec05    | 1/10/06  | 1/12/06        |
| Progress Report Jan-Mar06    | 4/10/06  | 4/7/06         |
| Progress Report April-Jun06  | 7/10/06  | 7/11/06        |
| Progress Report July-Sept 06 | 10/10/06 | 10/11/06       |
| Progress Report Oct-Dec 06   | 1/10/07  | 1/16/07        |
| Progress Report Jan-Mar 07   | 4/10/07  | 4/12/07        |
| Progress Report Apr-Jun 07   | 7/10/07  | 7/11/07        |
| Progress Report Jul-Sept 07  | 10/10/07 | 10/11/07       |
| Progress Report Oct-Dec 07   | 1/10/08  | 2/18/08        |

Task 3.4.3 Annual project reports

Annual reports were prepared summarizing all aspects of the eradication program. Also included was a summary of outreach efforts and the results of any assigned additional tasks. The annual reports prepared during the time period covered by this grant are the fourth, fifth, and sixth year annual reports for Agua Hedionda Lagoon and were submitted to the Contract Manager on April 11, 2005, April 7, 2006, and July 11, 2007. These status reports are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 3.4.3 Annual Reports.

| Deliverable title | Due Date | Date Submitted |
|-------------------|----------|----------------|
| Annual Report #1  | 1/10/05  | 4/1/05         |
| Annual Report #2  | 1/10/06  | 4/7/06         |
| Annual Report #2  | 1/10/07  | 7/11/07        |

Task 4. Outreach and Education

4.1. SCCAT Meeting Updates

Under this task AHLF and its subcontractor M&A provided an update on the Outreach and Education Program at a regularly scheduled meetings on 1/25/06, 4/6/06, 8/4/06, 10/4/06, 9/22/06, 1/16/07, 5/10/07, and 10/31/07. M&A Subcontractor Katz & Associates attended the 11/16/07 meeting in order to meet the Steering Committee and provide their proposed outreach strategy and the 4/10/07 to present the status of their outreach efforts to date and to get feedback from the Steering Committee. Copies of the Outreach update presentations given at these meetings were delivered to the Contract Manager with quarterly progress reports and are also included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 4.1 Outreach Presentation Materials for SCCAT Meetings.

#### *4.2. Plan for Southern California Caulerpa Outreach and Education Program*

The Southern California *Caulerpa* Outreach and Education Program Work Plan was approved by the Steering Committee and Contract Manager on August 4, 2005 and submitted to the Contract Manager in October 2005. The plan identified the desired results of the program, summarized the outreach objectives, outlined a four phase work plan, included plans to evaluate the effectiveness of the outreach efforts, and specified data management procedures.

The four phases of the program identified included Phase 1: Identification and Prioritization of Target Audience Groups (broad categories such as retail aquarium stores), Phase 2: Identification of Specific Target Audiences (specific targets such as ABC Aquarium Store, with contact information compiled into a database), Phase 3: Preparation of Strategies and Materials (determine how to outreach to each group and prepare materials such as pamphlets), and Phase 4: Conduct Outreach and Education.

The Southern California *Caulerpa* Outreach and Education Program Work Plan is included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 4.2 Plan for Outreach and Education Program.

#### *4.3. Conduct Outreach and Education*

A report on the work conducted on each of the four phases of the outreach program described above is provided below. The outreach program will continue through June 2008, when funding for the program from a separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds are expended. The progress through December 2007 is reported below.

##### ***Phase 1***

Phase 1 of the Southern California Outreach and Education Program involved the identification and prioritization of target audience groups, which was completed as part of the Plan for Southern California *Caulerpa* Outreach and Education Program. The audience types that fell into the Priority 1 level were categorized as Saltwater Aquarium, Harbors/Bays/Boating/Fishing, Stewards, and Diving. Only those that occurred in Los Angeles, Orange, and San Diego counties were included as Priority 1 (Table 1).

Table 6. Prioritized target audiences for outreach.

| Audience Category                   | Audience Type                           | Priority | County |           |             |         |               |
|-------------------------------------|---|----------|--------|-----------|-------------|---------|---------------|
|                                     |   |          | Orange | San Diego | Los Angeles | Ventura | Santa Barbara |
|                                     |   |          | 1      |           | 2           |         | 3             |
| <b>Saltwater Aquarium</b>           | Saltwater Aquarist Clubs                | 1        |        | 1         | 2           | 3       |               |
|                                     | Aquarist Newsletters/Magazines          |          |        |           |             |         |               |
|                                     | Public Aquariums                        |          |        |           |             |         |               |
|                                     | Aquarium Maintenance Providers          |          |        |           |             |         |               |
|                                     | Retail Pet Shops with Aquarium Supplies |          |        |           |             |         |               |
|                                     | Retail Aquarium Supply Shops            |          |        |           |             |         |               |
|                                     | Online Retail Aquarium Suppliers        |          |        |           |             |         |               |
|                                     | Wholesale Aquarium Suppliers            |          |        |           |             |         |               |
| <b>Harbors/Bays/Boating/Fishing</b> | Marinas & Anchorages                    |          |        |           |             |         |               |
|                                     | Harbor Masters/Port Captains            |          |        |           |             |         |               |
|                                     | Marine Construction                     |          |        |           |             |         |               |
| <b>Stewards</b>                     | Educators                               |          |        |           |             |         |               |
|                                     | Non-profit Environmental Groups         |          |        |           |             |         |               |
|                                     | Coastal Reserves                        |          |        |           |             |         |               |
| <b>Diving</b>                       | Dive Clubs - University/Scientific      |          |        |           |             |         |               |
| <b>Harbors/Bays/Boating/Fishing</b> | Yacht Clubs                             | 2        |        |           |             |         |               |
|                                     | Research Institutes                     |          |        |           |             |         |               |
| <b>Stewards</b>                     | Science Newsletters/Magazines           | 2        |        | 2         | 3           | 4       |               |
|                                     | Governmental Organizations              |          |        |           |             |         |               |
|                                     | Dive Clubs – Recreational               |          |        |           |             |         |               |
| <b>Diving</b>                       | Dive Clubs – Online                     |          |        |           |             |         |               |
|                                     | Diving Newsletters/Magazines            |          |        |           |             |         |               |
|                                     | Homeowners / Residents                  |          |        |           |             |         |               |
| <b>Harbors/Bays/Boating/Fishing</b> | Boating/Fishing Newsletters/Magazines   | 3        |        |           |             |         |               |
|                                     | Dive Charters                           |          |        |           |             |         |               |
| <b>Diving</b>                       | Dive Equipment Suppliers                | 3        |        | 3         | 4           | 5       |               |
|                                     | Diver Trainers                          |          |        |           |             |         |               |
|                                     | Fishing Charters                        |          |        |           |             |         |               |
| <b>Harbors/Bays/Boating/Fishing</b> | Bait & Tackle Suppliers                 | 4        |        |           | 5           | 6       |               |
|                                     | Boat Maintenance Providers              |          |        |           |             |         |               |
|                                     | Hull Cleaners                           |          |        |           |             |         |               |
|                                     |   |          |        |           |             |         |               |

**Phase 2**

The second phase of the program involved the identification of specific target audiences in each of the Priority 1 audience groups. These data were collected through a variety of sources including the Internet, phone books, word or mouth, and existing contact data gathered throughout the eradication effort. A database was developed to manage contact information and outreach records. The information recorded included name, address, affiliation, contact person, phone numbers, and outreach objective (i.e., pathways, detection, and/or stewardship). Fields were included for recording the outreach conducted including: method used, materials presented or distributed, evaluation activities conducted, and outcome notes. The database is continually updated and maintained as outreach activities are conducted or as contact information needs to be changes. The database will be completed and formatted for presentation at the conclusion of the outreach program in June 2008.

**Phase 3**

Phase 3 of the outreach program involves developing specific outreach strategies for each Priority 1 audience group and creating the materials needed to conduct the outreach. The strategies drafted are listed below. These strategies are revised and updated as research and experience provides updated information and additional insight.

Table 7. Audience group outreach strategies.

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Saltwater Aquarist Clubs</b> – Orange, San Diego and Los Angeles counties  |
| <b>Objective(s):</b>              | Pathways and Education:<br>(1) Use clubs as means to disseminate information and educate the general public. Outreach efforts will raise awareness so that members can help spread the word to colleagues and contacts about <i>Caulerpa</i> and its effects.<br><br>(2) Outreach to help change behavior of club leaders in order to influence members and prevent new infestations.   |
| <b>Specific Target Audiences:</b> | Seven clubs - See database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release, importance of raising awareness of the issue.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Develop speakers bureau program and offer presentations for club meetings</li> <li>• Contact club newsletter editor for placement of template articles</li> <li>• Contact club webmaster for posting information or survey on website</li> <li>• Research and attend club social functions to informally meet members and discuss <i>Caulerpa</i></li> <li>• Contact club president for distributing information flyer with new member packets</li> <li>• Give away small items with message on it</li> <li>• Conduct member surveys at club presentations</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> </ul> |
| <b>Materials:</b>                 | Cover letter, fact sheet, pamphlet, slide presentation, giveaways with info (soda coozie, sticky notes)   |

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Saltwater Aquarium Hobbyists</b> – through on-line forums  |
| <b>Objective(s):</b>              | Pathways and Education:<br>(1) Use online forums as means to disseminate information and educate the general public. Outreach efforts will raise awareness.<br><br>(2) Outreach to help change behavior of aquarists and influence fellow aquarists   |
| <b>Specific Target Audiences:</b> | Online forums – four most popular   |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release, importance of raising awareness of the issue.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Join online forums</li> <li>• Regularly search for conversations re: <i>Caulerpa</i></li> <li>• Join conversation to provide correct information on <i>Caulerpa</i></li> <li>• Keep website (SCCAT.net) updated and refer to it in postings</li> <li>• Place banner ads on forums</li> </ul> |
| <b>Materials:</b>                 | Banner ad. Content developed as appropriate to topic discussed.   |

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Aquarist Newsletters/Magazines</b> – National and local  |
| <b>Objective(s):</b>              | Education - Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .  |
| <b>Specific Target Audiences:</b> | See Database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Place informational ads in hobbyist magazines.</li> <li>• Contact newsletters and magazines for placement of editorials or feature articles and advertisements</li> <li>• Contact newsletters and magazines for distributing information flyer with newsletter/magazine to subscribers</li> <li>• Contact newsletters and magazines for developing “information request” postcard to be inserted in newsletter/magazine</li> <li>• Contact webmaster to post information or surveys on website</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> </ul> |
| <b>Materials:</b>                 | Advertisements and technical articles   |

|                                   |  |
|-----------------------------------|--|
| <b>Audience Group:</b>            | <b>Public Aquariums</b> – So Cal and San Francisco   |
| <b>Objective(s):</b>              | Education - Outreach efforts will raise awareness and educate patrons about the invasive species <i>Caulerpa</i> .   |
| <b>Specific Target Audiences:</b> | Ten aquariums selected by SCCAT - See database   |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release, importance of raising awareness.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Contact aquarium manager for posting displays or holding exhibits</li> <li>• Contact aquarium manager for enclosing information flyers with facility map, or disseminating at ticket booth or entrance</li> <li>• Explore possibility of having an information booth outside/near the entrance of the aquarium</li> <li>• Contact program editor for advertisement opportunities in program or aquarium booklet</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> </ul> |
| <b>Materials:</b>                 | Cover letter, fact sheet, pamphlet, poster   |

|                                   |  |
|-----------------------------------|--|
| <b>Audience Group:</b>            | <b>Aquarium Maintenance Providers</b> – Orange, San Diego and Los Angeles counties   |
| <b>Objective(s):</b>              | Pathways – Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .  |
| <b>Specific Target Audiences:</b> | Seventy-six providers- See database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release.   |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Contact wholesalers for offering discount coupons and distribute to maintenance providers</li> <li>• Provide literature through mail and email</li> <li>• Conduct surveys by mail, email or phone contact</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> </ul> |
| <b>Materials:</b>                 | Cover letter, fact sheet   |

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Retail Pet Shops with Aquarium Supplies</b> – Orange, San Diego and Los Angeles counties   |
| <b>Objective(s):</b>              | Pathways and Education – Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .   |
| <b>Specific Target Audiences:</b> | Big chain stores: See database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Visit aquarium stores to speak with owner/manager and drop off materials</li> <li>• Explore potential for including disposal note on bags used in the sale of aquarium plants and fish</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> <li>• Contact store owner/manager for displaying information boards, having a small exhibit or table of information and representative</li> <li>• Explore possibility of distributing aquarium reminder stickers to purchasers of aquariums</li> <li>• Contact store owner/manager for distributing surveys to aquarium supply buyers or conducting in-store surveys</li> </ul> |
| <b>Materials:</b>                 | For distribution/posting at stores: introductory letter to manager/owner, poster, fact sheet, pamphlet, aquarium supply bags printed with <i>Caulerpa</i> information.  |

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Retail Aquarium Supply Shops</b> – Orange, San Diego and Los Angeles counties  |
| <b>Objective(s):</b>              | Pathways and Education– Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .  |
| <b>Specific Target Audiences:</b> | Eighty-four stores- See database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release.  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>• Coordinate with California Department of Fish and Game regarding past outreach efforts to this audience</li> <li>• Visit aquarium stores to speak with owner/manager and drop off materials (CDFG senior volunteers)</li> <li>• Explore potential for including disposal note on bags used in the sale of aquarium plants and fish</li> <li>• Keep website (SCCAT.net) updated and cite it on materials</li> </ul> |

|                   |   |
|-------------------|---|
|                   | <ul style="list-style-type: none"> <li>Explore possibility of distributing aquarium reminder stickers to purchasers of aquariums</li> </ul>                                     |
| <b>Materials:</b> | For distribution/posting at aquarium stores: introductory letter to manager/owner, poster, fact sheet, pamphlet, aquarium supply bags printed with <i>Caulerpa</i> information. |

|                                   |  |
|-----------------------------------|--|
| <b>Audience Group:</b>            | <b>Online Retail Aquarium Suppliers – all areas</b>  |
| <b>Objective(s):</b>              | Pathways – Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .  |
| <b>Specific Target Audiences:</b> | Online retailers and ebay- see Database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release.   |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>Contact webmaster or advertising department for posting advertisements</li> <li>Contact webmaster for creating pop up windows when clicking on <i>Caulerpa</i>-related information</li> <li>Contact webmaster to post more information about not shipping to California and the <i>Caulerpa</i> threat</li> <li>Contact webmaster for creating link to SCCAT.net</li> <li>Contact webmaster for posting online surveys</li> </ul> |
| <b>Materials:</b>                 | Banner advertisement, cover letter, fact sheet   |

|                                   |  |
|-----------------------------------|--|
| <b>Audience Group:</b>            | <b>Wholesale Aquarium Suppliers – Orange, San Diego and Los Angeles counties</b>   |
| <b>Objective(s):</b>              | Pathways – Outreach efforts will raise awareness and change behaviors in order to prevent both new introductions and the spread of existing infestations of invasive species of <i>Caulerpa</i> .                          |
| <b>Specific Target Audiences:</b> | See database   |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), proper disposal of aquarium contents, alternatives to <i>Caulerpa</i> , economic and biological cost of eradicating infestations resulting from inadvertent release. |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>Research trade shows and possibility of having booth</li> <li>Provide cover letter and fact sheet.</li> </ul>   |
| <b>Materials:</b>                 | Cover letter and fact sheet.   |

|                                   |   |
|-----------------------------------|---|
| <b>Audience Group:</b>            | <b>Scientific Divers – Orange, San Diego and Los Angeles counties</b>   |
| <b>Objective(s):</b>              | Detection – Outreach efforts will raise awareness about <i>Caulerpa</i> and provide identification and survey technique information to research and scientific divers to detect undiscovered infestations.  |
| <b>Specific Target Audiences:</b> | See database  |
| <b>Key Messages:</b>              | <i>Caulerpa</i> info (threat, legal status, biology), identification and reporting protocols  |
| <b>Actions:</b>                   | <ul style="list-style-type: none"> <li>give presentations to universities offering scientific diving certifications or conducting scientific diving</li> <li>pursue inclusion of <i>Caulerpa</i> ID into SCUBA training</li> <li>provide information for posting on university SCUBA websites</li> <li>Provide identification and contact literature</li> </ul> |
| <b>Materials:</b>                 | ID info, presentation on ID and contact procedures, fact sheet, poster  |

Materials were developed for the various audience groups above and distributed to the Steering Committee for comment and approval. Materials included: A detailed, tri-fold informational brochure targeting all audiences, a fact sheet entitled Environmental Alert (appropriate for all audiences), a fact sheet entitled Caulerpa Facts for Aquarium Retailers, a fact sheet entitled Caulerpa Facts for Aquarium Owners, a fact sheet entitled Caulerpa Facts for Aquarium Maintenance Providers, and cover letters to non-profit environmental groups, saltwater aquarium retailers, general pet retailers with aquariums, saltwater aquarium club presidents, aquarium maintenance providers, and public aquarium directors.

To display facts sheets, plastic stands were purchased, and SCCAT logo stickers with the slogan “Be responsible. Don’t use *Caulerpa*.” were printed to place on the front of the stands. “Promotional” items produced to give to aquarists at club meetings and trade shows were soda “coozies” (neoprene beverage coolers to be slipped over an aluminum can) and sticky notes, both of which had the SCCAT logo and above slogan printed on them. The coozies also said “Protect Our Ocean from a Caulerpa Invasion.”

Several advertising materials were generated as well: a full page color advertisement directed at saltwater aquarists (referred to as the “aquarist ad”), a more general full page color advertisement directed at aquarists and pet owners in general (referred to as the “simple ad”), a full page color advertisement directed at SCUBA divers relating to detection of undiscovered infestations (referred to as the “diver ad”), and web banner ads of various sizes directed at aquarists and divers for use on appropriate websites.

A large 4 X 8 foot banner was produced for use at trade shows and other “booth” opportunities. A poster was developed based on the simple ad mentioned above.

PowerPoint presentations were developed for saltwater aquarist clubs (prevention) and SCUBA divers (detection).

Electronic versions of all of the deliverables above (generated to date) are included in the Compendium of Results and Deliverables CD attached to this document in the folder labeled Task 4.3 Outreach Materials. Photos of some of the materials are included in the outreach section below.

**Table 8.**

| Outreach Material  | Submittal Date |
|--|----------------|
| PowerPoint presentation to divers (Detection)                    | 10/11/06       |
| Presentation announcement to Sharkbait Dive Club                 | 1/15/07        |
| Fact Sheet – Environmental Alert                                 | 4/12/07        |
| Fact Sheet – Caulerpa Facts for Aquarium Owners                  | 4/12/07        |
| Fact Sheet – Caulerpa Facts for Aquarium Maintenance Providers   | 4/12/07        |
| Fact Sheet – Caulerpa Facts for Aquarium Retailers               | 4/12/07        |
| Print Advertisement – For aquarist publications                  | 4/12/07        |
| Print Advertisement – For diver publications                     | 4/12/07        |
| Print Advertisement – For aquarist/general audience publications | 10/11/07       |
| Trade Article – for aquarium hobbyist magazines                  | 10/11/07       |
| PowerPoint presentation to aquarists (prevention)                | 2/18/08        |
| Internet Banner Ad – aquarists                                   | 2/18/08        |

|  |         |
|--|---------|
| Internet Banner Ad – divers                | 2/18/08 |
| Thermal drink holder with outreach message | 2/18/08 |
| Sticky-notes with outreach message         | 2/18/08 |
| Trade Show banner                          | 2/18/08 |

#### **Phase 4**

Phase 4 of the outreach program involves conducting the outreach actions identified in Phase 3. A professional outreach/public relations firm, Katz and Associates, was contracted to provide a focused strategy to provide outreach to audiences perceived to be more challenging, specifically the aquarium trade, and to develop the materials described above. Outreach to targeted Priority 1 audiences to date is summarized in the following table and further detailed below.

#### **Aquarium Retailers and Hobbyists**

Outreach to saltwater aquarists was accomplished through various avenues, including advertising, letters, fact sheets, and trade shows.

Print ads were run in the popular aquarium hobbyist magazines and the full advertising schedule for the period covered by this report is presented in the following table 4. The aquarist ad was run in Tropical Fish Hobbyist (circulation 25,000), Aquarium Fish International (circulation 50,000), Freshwater and Marine Aquarium (circulation 20,000), Aquarium USA (2009 annual), and Marine Fish and Reef USA (2008 and 2009 annuals). The last flight in Tropical Fish Hobbyist (February to April 2008) will use the simple ad for variation.

The simple ad was also published in the bi-annual Marine Depot product catalog, prominently positioned on page 6 of this marine aquarium supply catalog for hobbyists. This catalog has a circulation of approximately 95,000.

The banner ads discussed above were placed with the online magazines Advanced Aquarist ([http://www.advanced\\_aquarist.com/](http://www.advanced_aquarist.com/)) and The Conscientious Aquarist (<http://www.wetwebmedia.com/ca/CAHomepage.htm>), and on the online aquarist forum Reefs.org (<http://www.reefs.org/>).

To reach a more general audience of pet-enthusiasts that might be aquarium-oriented, the simple ad was placed in San Diego Pets magazine, a free publication distributed bi-monthly at 500 locations in San Diego County including pet stores, veterinarian offices, animal shelters (20,000 copies per printing). Advertising in this magazine will continue through the April/May 2008 issue (earlier issues featured the more technical aquarist ad).

We were invited by Aquarium Fish International to write a short informational article about *C. taxifolia*, which was submitted for inclusion in the November issue. The companion website to this magazine (The Fish Channel) featured the article on the home page, provided a link to the sccat.net website, and included an area to comment on the article. This text provided background on the issue of *Caulerpa* and recommended alternative species. The online article can be viewed on the links page of [www.sccat.net](http://www.sccat.net) (under The Fish Channel article).

Table 9. Outreach material distribution summary for outreach program through December 2007 (program ongoing).

| <b>Outreach Material</b>   | <b>Distributed To</b>   |
|--|---|
| Fact Sheet – Environmental Alert                                 | Environmental Stewards/Non profit environmental groups, public aquariums* |
| Fact Sheet – Caulerpa Facts for Aquarium Owners                  | Aquarium clubs, trade show attendants, all Priority 1 aquarium stores **  |
| Fact Sheet – Caulerpa Facts for Aquarium Maintenance Providers   | Aquarium Maintenance Providers **   |
| Fact Sheet – Caulerpa Facts for Aquarium Retailers               | all Priority 1 aquarium stores, trade show attendants                     |
| Print Advertisement – For aquarist publications                  | All major aquarium trade magazines*                                       |
| Print Advertisement – For diver publications                     | California Diving News  |
| Print Advertisement – For aquarist/general audience publications | Marine Depot catalog, SD Pets Magazine                                    |
| Trade Article – for aquarium hobbyist magazines                  | Aquarium Fish International Magazine – December 2007 issue                |
| PowerPoint presentation to aquarists                             | Saltwater aquarium hobbyist clubs*  |
| Internet Banner Ad – aquarists                                   | Major online saltwater aquarist forums                                    |
| Internet Banner Ad – divers                                      | California Diving News website  |
| Thermal drink holder with outreach message                       | Aquarium clubs, trade show attendants                                     |
| Sticky-notes with outreach message                               | Aquarium clubs, trade show attendants                                     |
| Trade Show banner  | Displayed at trade show   |
| PowerPoint presentation to divers                                | Scuba diving club meetings*   |

\* Specific target names listed in the outreach descriptions by audience in the text to follow

\*\*Specific target names listed in the appendix to this report

Table 10. Advertising schedule (additional advertising planned for remainder of program).

| Publication   | COST - Flight 1 | COST - Flight 2 | COST - Flight 3 | AD RUN 2007/2008                                       |    |    |    |    |    |    |    |    |    |    |    |   |
|---|-----------------|-----------------|-----------------|--|----|----|----|----|----|----|----|----|----|----|----|---|
|   |                 |                 |                 | JU   | JY | AG | ST | OC | NV | DC | JA | FB | MR | AP | MY |   |
| <b>Aquarist Print - Aquarist &amp; Simple Ad</b>              |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| Aquarium Fish International                                   |                 | \$8,723.55      | \$8,723.55      |  |    |    | X  | X  | X  | X  | X  | X  |    |    |    |   |
| Freshwater and Marine Aquarium                                |                 | \$2,945.25      |                 |  |    |    |    |    | X  | X  | X  |    |    |    |    |   |
| Marine Depot Catalog - Fall                                   |                 |                 | \$2,418.90      |  |    |    |    |    | X  | X  | X  | X  | X  | X  |    |   |
| Tropical Fish Hobbyist  | \$5,264.70      |                 | \$5,264.70      |  |    | X  | X  | X  |    |    |    |    | X  | X  | X  |   |
| Tropical Fish Hobbyist<br>1 month free Banner ad for Web Site | \$0.00          | \$0.00          | \$0.00          |  | X  |    |    |    |    |    |    |    |    |    |    |   |
| <b>Aquarist Annual - Aquarist Ad</b>                          |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| Aquarium USA  |                 | \$3,020.05      |                 | 2009 ISSUE- available May 2008                         |    |    |    |    |    |    |    |    |    |    |    |   |
| Marine Fish and Reef USA                                      | \$2,861.10      |                 | \$2,861.10      | 2008 and 2009 ISSUE - available Nov 2007 and Nov 2008. |    |    |    |    |    |    |    |    |    |    |    |   |
| <b>Boaters - Simple Ad</b>                                    |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| The Log - So. California edition                              |                 | \$3,750.00      |                 |  | X  | X  | X  |    |    |    |    |    |    |    |    |   |
| <b>Divers - Diver Ad</b>                                      |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| California Diving News<br>(Web site advertising included)     | \$0.00          | \$0.00          | \$0.00          |  | X  | X  | X  | X  | X  | X  |    |    |    | X  | X  | X |
| California Diving News  | \$5,271.75      | \$4,937.63      | \$4,937.63      |  | X  | X  | X  | X  | X  | X  |    |    |    | X  | X  | X |
| <b>General - Simple Ad</b>                                    |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| San Diego Pets Magazine<br>(bimonthly)                        | \$5,412.00      |                 | \$5,412.00      | X  |    | X  |    | X  |    | X  |    |    | X  |    | X  |   |
| <b>Aquarist Online - Banner Ads</b>                           |                 |                 |                 |  |    |    |    |    |    |    |    |    |    |    |    |   |
| Advanced Aquarist's Online<br>Magazine                        | \$742.50        | \$618.75        | \$618.75        |  | X  | X  | X  | X  | NC | X  | X  | X  | X  | NC | X  | X |
| Reefs.org (incl w Advanced Aquarist)                          | \$0.00          | \$0.00          | \$0.00          |  | X  | X  | X  | X  | NC | X  | X  | X  | X  | NC | X  | X |
| Conscientious Aquarist<br>(bimonthly)                         | \$412.50        | \$330.00        |                 |  | X  |    | X  |    | X  |    | X  |    | X  |    |    | X |
|   | \$19,964.55     | \$24,325.23     | \$30,236.63     |  |    |    |    |    |    |    |    |    |    |    |    |   |

To reach aquarium retailers and their customers, packets were prepared for distribution to 84 retailers identified as active and having a mailing address in San Diego, Orange, and Los Angeles counties. A full list of each shop is included in an appendix to this report.

Each packet included

- Retailer cover letter (1)
- Retailer fact sheet (1)
- Aquarist fact sheet for distribution (100)
- Fact sheet holder with SCCAT sticker (1)

The stores were all provided with contact information to request more fact sheets.

The California Department of Fish and Game senior volunteer program agreed to deliver the materials to the aquarium retailers. Volunteers were given protocols for distribution, a “script” to say while delivering, a list of stores to visit for tracking distribution, plus the outreach materials below. The packages were delivered to CDFG in August, however there were considerable and unanticipated delays in distribution. The packages were delivered to the San Diego stores in August, but as of January 2008, none of the Orange and Los Angeles county packages had been distributed. Further attempts at coordination with CDFG are under way.

Two saltwater aquarist trade shows were attended by AHLF contractor M&A through December 31, 2007. Reef-A- Palooza (in Orange County, August 2007) and the Marine Aquarium Society of North America conference (Pittsburgh, PA, September 2007). Both were very productive outreach opportunities, with highly engaging and receptive audiences.



**SCCAT booth at the Marine Aquarium Conference of North America (Pittsburgh, September 2007).**

Both shows expected to have about 1500 guests each. M&A distributed fact sheets, give-aways labeled with our key messages, and provided information on identification, alternatives, and state

by state regulations. People were very receptive to suggestions of alternatives and no one challenged the threat that *Caulerpa* poses or the reality that dumped aquariums are the source of infestations.

On April 20, 2007 a presentation was given to the Southern California Marine Aquarium Society in Santa Ana, CA. On October 12, a presentation was given to the North County Marine Aquarium Society in Oceanside, CA and on October 17 a presentation was given to the San Diego Marine Aquarium Society at the aquarium retailer Octopus’ Garden in San Diego, CA. The presentations included a PowerPoint talk, a question and answer session, and distribution of fact sheets, brochures, and soda can coolers and sticky notes with SCCAT logos and warnings about *Caulerpa* on them.

The table below summarizes meetings and trade shows attended as part of the outreach program.

**Table 11.**

| Outreach Event  | Materials  | Date       |
|---|--|------------|
| Attended SD Oceans Foundation REEF diver training, La Jolla, CA               | Brief talk, tri-fold pamphlet, watch cards, faux-lerpa   | 6/10/06    |
| Attended SD Oceans Foundation REEF diver training, La Jolla, CA               | tri-fold pamphlet, fielded questions                     | 7/6/06     |
| Presentation to Ocean Explorers Dive Club, La Jolla, CA                       | Brief talk, tri-fold pamphlet watch cards, faux-lerpa    | 8/5/06     |
| Presentation to San Diego Council of Divers, San Diego, CA                    | PowerPoint, tri-fold, watch cards, faux-lerpa            | 9/13/06    |
| Presentation to Blue Water Dive Club, Los Alamitos, CA                        | PowerPoint, tri-fold, watch cards, faux-lerpa            | 9/13/06    |
| Presentation to Sharkbait dive club – Anaheim, CA                             | PowerPoint, tri-fold, watch cards, faux-lerpa            | 11/14/06   |
| Presentation to So. Cal Marine Aquarium Society – Santa Ana, CA               | PowerPoint, tri-fold, watch cards, faux-lerpa            | 4/20/07    |
| Society of Wetland Scientists   | PowerPoint presentation                                  | 6/12/07    |
| Reef-a-palooza Marine Aquarium Trade Show- Costa Mesa, CA                     | Fact sheets, give aways, posters, banner, tri-fold       | 8/18/07    |
| Marine Aquarium Society of North America Trade Show, Pittsburgh, PA           | Fact sheets, give aways, posters, banner, tri-fold       | 9/14-16/07 |
| Presentation to North County Marine Aquarium Society – Oceanside, CA          | PowerPoint, fact sheet, tri-fold, give-aways, faux-lerpa | 10/12/07   |
| Presentation to San Diego Marine Aquarium Society – Oceanside, CA             | PowerPoint, fact sheet, tri-fold, give-aways, faux-lerpa | 10/17/07   |
| Headwaters to Oceans Conference - Long Beach, CA (not funded by this project) | PowerPoint presentation                                  | 10/24/07   |

### **Online Hobbyist Forums**

There is considerable discussion of *Caulerpa* and its use on the Internet. To provide accurate information on *Caulerpa*, the threat may pose if released, and its legal status, as well as respond to erroneous assertions made by some users, several of these forums were joined, with the only line user name of Caulerpanator, a fictitious character contemplated in early phases of the outreach program. Forums that were regularly visited were Reef Central (reefcentral.com), Reefs.org, Nano-Reef.com, and San Diego Reefs (SDreefs.com).

### **Aquarium Maintenance Providers**

The fact sheet for Aquarium Maintenance Providers was finalized and printed in May 2007. The content of the draft fact sheet was adjusted to address the misconceptions and unacceptable practices that were revealed by a survey of the service providers (discussed below). Many of them revealed they were willing to dump aquarium water and contents into harbors or storm drains when asked. The cover letter and fact sheet clarified the legal and environmental aspects related to *Caulerpa* use and disposal.

The fact sheets and a cover letter were mailed to 76 providers in San Diego, Orange, and Los Angeles counties in Fall 2007. A follow-up phone survey will be conducted within 6 months to determine if awareness and attitudes have changed. A list of the maintenance providers and the date they were mailed packages is included in the appendix of this document.

### **Public Aquariums**

In February 2007 a letter was sent to all southern California public aquariums, as well as the Steinhart Aquarium in San Francisco, at the request of the SCCAT Steering Committee (signed by the Steering Committee Chair). The letter introduced SCCAT and expressed the interest of the outreach program to collaborate to develop interpretive materials/displays for *Caulerpa* outreach at their aquariums. To date, the Cabrillo Marine Aquarium in San Pedro and Steinhart Aquarium has expressed interest in receiving materials and enhancing those that they already have on display. Follow-up calls to each aquarium will be made in the upcoming year.

### **Research SCUBA Divers**

Attempts to give presentations to academic research diver groups in the target areas have been largely unsuccessful, presumably because the programs are only loosely organized, highly transitory in membership, and seasonally dependent on academic schedules. In an effort to reach these divers, which are likely recreational divers as well, an advertisement was placed in the only California diving publication: California Diving News. The advertisement will run from July 2007 through May 2008. This audience falls in the Detection, rather than Prevention, category, with the ad calling for divers to learn what *Caulerpa* looks like, keep an eye out for it on dives, and report any sightings.

Outreach presentations were also given to the San Diego Dive Club, Blue Water Dive Club, and the San Diego Council of Divers, an umbrella group for dive associations in San Diego County. Identification materials were provided to several diving websites and dive club newsletters to reach a wider audience. Several club sites have posted links to the SCCAT website.

### **Environmental Stewards**

A list of non-profit environmental stewards that might be in a position to help distribute informational materials about *Caulerpa*, including local lagoon foundations and nature centers, was contacted during this quarter, including offering to provide informational presentations. Based on their response or interest level, follow-ups were conducted as described below:

Contacted via email in October 2007 with general fact sheet attached electronically were:

- Torrey Pines State Reserve
- Pacific Marine Conservation Council
- San Diego Coastkeeper
- Santa Monica Baykeeper (email sent via their website; no fact sheet attachment)
- Surfrider Foundation, San Diego Chapter

Contacted via letter in October 2007 with sample general fact sheet and brochure trifold enclosed:

- Batiquitos Lagoon Foundation
- Chula Vista Nature Center
- San Diego River Park Foundation
- Orange County Coastkeeper

Contact via letter in October 2007 with general fact sheets enclosed for distribution, including fact sheet holder:

- San Elijo Lagoon Conservancy
- Tijuana Estuary Visitor Center
- Windows On Our Waters

Contact was unsuccessful with the San Diego Bay National Wildlife Refuge, Seal Beach National Wildlife Refuge, and La Jolla Underwater Park. Heal the Bay requested that fact sheets not be sent and indicated that they have no opportunities for presentations.

In June and August 2006, the general informational brochure was distributed at the San Diego Oceans Foundation underwater training classes for volunteer divers conducting research on local reefs. At the June class, a brief explanation of the *Caulerpa* issue was given and a request made for a show of hands from people who had heard of *Caulerpa*. Twenty out of 65 were familiar with *Caulerpa*. An outreach representative did not attend the August class, however pamphlets were provided to the instructor for distribution. Brochures were also passed out to the 25 attendees of a San Diego Oceans Foundation presentation to volunteer research SCUBA divers on rockfish identification in August 2005.

#### 4.4. Evaluate Effectiveness of outreach efforts

Evaluation of outreach efforts to date has focused on obtaining “pre-outreach” baseline information. One target audience is on-line sellers of aquarium supplies. In order to determine the availability of banned *Caulerpa* species on the Internet, an investigation into the ease or difficulty of obtaining *Caulerpa* was initiated in December 2006, to be completed in January 2007. Initial results suggest that *Caulerpa* is less popular than it has been in the past, is often substituted for by the seaweed *Chaetomorpha*, and that some vendors refuse to sell to California addresses. Final results will be used to target outreach efforts, which will likely take the form of paper and electronic letters to on-line sellers of *Caulerpa*, coordination with Ebay regarding their policy on sale of prohibited or restricted items, and possibly an insertion of an informational “pop-up” on reputable on-line vendor websites that would appear when buyers search for *Caulerpa*. This survey will be repeated between March and June 2008 of the outreach program to see if availability has decreased, using funding from a separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds.

#### **Hobbyists**

Baseline data on the attitudes and beliefs of aquarium hobbyists were obtained through surveys conducted during the trade shows attended in summer 2007. At Reef-a-Palooza, a survey conducted of the hobbyists found that 10% use *Caulerpa* in their tanks, 35% use it in their refugia, and 55% do not use it at all. Fifty-three percent knew that it is illegal to possess most species of *Caulerpa*.

At the Marine Aquarium Conference of North America, aquarists were nearly unanimous in their disdain for *Caulerpa*, as invasive and having a tendency to “go sexual” and ruin their systems. However, 56% of people reported using *Caulerpa*, most inadvertently when it came in with other macroalgae. Nearly all agreed that *Chaetomorpha* was a superior choice for filtration in refugia, given the problems *Caulerpa* caused in their systems. We recommend this and other species in all of our outreach materials. Of all visitors to the SCCAT booth, only 2 expressed disagreement with regulation, suggesting that we should rely on people acting responsibly. Interestingly, in my survey (53 respondents), 90% acknowledged that they believe people frequently release unwanted pets/tanks into the wild.

#### **Aquarium Maintenance Providers**

In January and February 2007 a phone survey of aquarium maintenance providers listed in the target database was conducted. The surveyor posed as a potential customer living on the water in a local harbor and desiring installation and maintenance of a saltwater tank. The results of the conversation were then recorded to answer several key questions and the results tallied. Of the thirteen respondents, 38% indicated they would dispose of aquarium water appropriately (sewer), 62% indicated they would be willing to drain aquarium water into the storm drain at the house, and 38% indicated they would be willing to drain aquarium water directly into the harbor. Overlap is reflective of multiple disposal options provided by the provider. Of those that said they would dump aquarium water into the harbor, several indicated that it would need to be done discreetly.

Based on the results of the survey, the introductory letter and fact sheet sent to the providers were updated to specifically address the views and issues revealed in this survey. This survey will be repeated between March and June 2008 of the outreach program using funds from a

separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds, to see if attitudes among providers have changed.

### **Aquarium Retailers**

Prior to distribution, a voluntary phone survey was conducted of retailers to assess and document the level of awareness regarding *Caulerpa* prior to distribution of fact sheets. A total of 84 aquarium retailers were contacted between July 17 and Aug. 29, 2007. Of the businesses contacted, 37 completed the survey. The responses to the survey are outlined below.

#### **Aquarium retailer pre-fact sheet distribution awareness survey**

Question 1: Have you heard of *Caulerpa*?

Yes 92% (34)

No 8% (3)

Question 2: What do you know about *Caulerpa*?

Harmful 54% (20)

- Bad for ecosystems/takes over environments
- Dangerous to wildlife
- Harmful to other plants
- Harmful to animals
- Damages coral
- Destroys lagoons
- Bad for fish and environment
- Fish hate it
- Difficult to control
- Ruined/Issue in the Mediterranean
- Problems in Sacramento
- Got into local bays

Illegal or banned 38% (14)

Spreads quickly 30% (11)

Algae 19% (7)

Plant 16% (6)

Seaweed 16% (6)

Lives in saltwater 13% (5)

Know nothing 11% (4)

Invasive 11% (4)

Removes nitrates 8% (3)

Question 3: Do your customers ask about it?

Yes 65% (24)

- Of this 65%, 17% (4) said they explain that it is illegal.

No 35% (13)

Question 4: Do you stock it or make it available to your customers?

No 92% (34)

Yes 3% (1)

N/A 5% (2). The “N/A” responses were received from businesses who replied that they are a service/installation/maintenance business and do not supply products.

Question 5: Did you know *Caulerpa* is a problem to native life in the wild?

Yes 84% (31)

No 16% (6)

Question 6: Did you know *Caulerpa* has been outlawed in California?

Yes 89% (33)

No 11% (4)

This survey will be repeated between March and June 2008 of the outreach program using funds from a separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds, to assess any change in their knowledge of *Caulerpa*.

A second, non-formal survey was conducted in on July 2 and 3, 2007, prior to distribution of outreach materials (later found to be delayed by CDFG schedule). All stores in the aquarium retailer database were called and asked a series of questions about the availability of *Caulerpa* in their stores. Of the businesses contacted, 71 provided survey data. The responses to the survey are outlined below.

#### **Aquarium retailer pre-fact sheet distribution *Caulerpa* availability survey**

Question 1: Do you carry any saltwater plants?

Yes 32% (23)

No 68% (48)

Question 2: Can you recommend what plants I should use in my refugium?

Recommended *Caulerpa* 13% (9)

Recommended alternative 10% (7)

No recommendation 77% (55)

Question 3: Do you have *Caulerpa* in stock?

Yes (out of all stores) 13% (9)

Yes (out of stores that sell saltwater plants) 39% (9 out of 23)

This survey will be repeated between March and June 2008 of the outreach program using funds from a separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds, to assess any change in the availability of *Caulerpa* at retail aquarium stores.

#### 4.5. *Email Status Reports*

AHLF contractor M&A sent out regular outreach update reports by e-mail in conjunction with regular twice-monthly updates to the SCCAT Steering Committee and its designees. These reports described all outreach activities conducted during the reporting period, including details of materials developed, advertisements placed, target audience response, and the results of any evaluation efforts. The reporting periods were generally the 1<sup>st</sup> through the 15<sup>th</sup> and the 16<sup>th</sup> through the end of each month. The e-mail status reports are included in the Compendium of

Results and Deliverables CD attached to this document in the folder labeled Task 4.5 Email Updates.

4.6. *Other Outreach Duties as Directed*

This task included performing any outreach tasks outside those described in the Outreach Plan, and generally included responding to outreach related emails from SCCAT Steering Committee members. An additional task was a request for a member of SCCAT to provide a presentation of the status of *Caulerpa* in California to the Society of Wetland Scientists on June 12, 2007. A representative of M&A provided a presentation summarizing the potential impacts of *Caulerpa* on wetlands and lessons learned from SCCAT's eradication program. Upcoming tasks that were not initiated but have been requested include creating presentation boards for CDFG and NOAA use at public events such as trade shows and scientific conferences. This work will be funded by a separate Prop 13 grant and Santa Ana Regional Water Quality Control Board funds.

**PROJECT COSTS**

The portion of the eradication program reported on in this document was funded by the present Agreement (EPA Clean Water Act Section 319h grant) and matching funds provided by the California Coastal Conservancy – Wetlands Recovery Project.

The project funding was broken down into the five categories presented below, with the expenditures and matching fund expenditures listed.

**Table 12.**

| Task                              | 319h         | Match Required | Match Spent    |
|-----------------------------------|--------------|----------------|----------------|
| 1. Project Administration         | \$40,000.00  | \$40,000.00    | \$78,876.19    |
| 2. CEQA Documents                 | \$0.00       | \$0.00         | \$0.00         |
| 3. Surveillance & Eradication     | \$385,000.00 | \$480,000.00   | \$870,013.39   |
| 4. Outreach and Education         | \$80,000.00  | \$80,000.00    | \$76,622.98    |
| 5. Draft and Final Project Report | \$5,000.00   | \$0.00         | \$0.00         |
| Totals                            | \$500,000.00 | \$600,000.00   | \$1,025,512.56 |

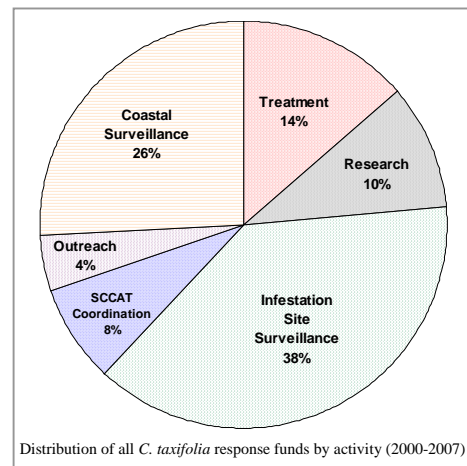
**Matching Funds**

The Section 319h grant funds required a match of \$600,000. This match obligation was met and significantly surpassed, with a total match of \$1,025,513. Matching funds were provided by a grant from the California Coastal Conservancy to the Agua Hedionda Lagoon Foundation. The grant was awarded to the Foundation as contract number 02-111- *Caulerpa taxifolia* Eradication Program in March 2003 and covered eradication and outreach work from December 2003 through March 2007.

The work funded by the Coastal Conservancy grant was a continuation of programs already and under way and, from October 2004 to December 2007, alternately funded by the present 319h grant. These tasks included SCCAT coordination, follow-up surveillance for *Caulerpa*, removal of treatment materials from Agua Hedionda Lagoon, implementation of the Plan for *Caulerpa taxifolia* Outreach and Education, and project reporting. Matching funds spent on each task are listed in the table above.

**Overall Project Costs**

The Southern California *Caulerpa taxifolia* Eradication Program has received funds from many sources since it began in 2000, as shown in Table 13. Although expenses included program research and development, treatment of *C. taxifolia*, surveillance and mapping, outreach and education, and a variety of data management and reporting tasks, the vast majority of the funds expended were for the intensive surveillance work. The work elements conducted from June 2000 to December 2005, leading to the recommendation to declare eradication, were directly funded by grants and allocations totaling approximately \$3,340,000 at Agua



**Table 13.**

**Summary of Funding for the Southern California *Caulerpa taxifolia* Eradication Program and Coastal Surveillance**

| SOURCE  |   | AMOUNT              | MAJOR WORK ELEMENTS  |
|---|---|---------------------|--|
| Agua Hedionda Lagoon Foundation               |   | \$ 5,000            | Outreach and Education Materials                                   |
| Cabrillo Power I LLC                          |   | \$ 123,000          | Survey and Treatment at Agua Hedionda Lagoon                       |
| Cabrillo Power I LLC                          |   | \$ 19,000           | Grant Acquisition  |
| Cabrillo Power I LLC                          |   | \$ 84,000           | Grant Acquisition  |
| Cabrillo Power I LLC                          |   | \$ 55,500           | Survey at Agua Hedionda Lagoon                                     |
| California Department of Fish and Game        | Section 27  | \$ 250,000          | Survey and Treatment at Agua Hedionda Lagoon/ Coastal Surveillance |
| California Department of Fish and Game        | Section 27  | \$ 265,000          | Treatment Research   |
| California Department of Fish and Game        | Section 27  | \$ 50,000           | Outreach and Education Materials                                   |
| California Department of Parks and Recreation |   | \$ 15,000           | Scientific Review of Eradication Program                           |
| FishAmerica Foundation                        | Grant to Agua Hedionda Lagoon Foundation            | \$ 30,000           | Survey at Agua Hedionda Lagoon                                     |
| National Fish and Wildlife Foundation         | Grant to Agua Hedionda Lagoon Foundation            | \$ 95,000           | Survey at Agua Hedionda Lagoon and Outreach and Education          |
| NOAA Community-Based Restoration Program      | Grant to Agua Hedionda Lagoon Foundation            | \$ 50,000           | Survey at Agua Hedionda Lagoon                                     |
| NOAA National Marine Fisheries Service        | Invasives Species Program                           | \$ 198,899          | Survey and Treatment at Agua Hedionda Lagoon/ Coastal Surveillance |
| NOAA National Marine Fisheries Service        | Invasives Species Program                           | \$ 99,000           | Survey at Agua Hedionda Lagoon                                     |
| NOAA National Marine Fisheries Service/USFWS  | Invasive Species Program/Bays and Estuaries Program | \$ 95,693           | Survey and Treatment at Agua Hedionda Lagoon                       |
| San Diego RWQCB                               | Cleanup and Abatement Fund                          | \$ 100,000          | Survey and Treatment at Agua Hedionda Lagoon                       |
| San Diego RWQCB                               | Cleanup and Abatement Fund                          | \$ 600,000          | Survey and Treatment at Agua Hedionda Lagoon                       |
| San Diego RWQCB                               | Cleanup and Abatement Funds to the City of Carlsbad | \$ 700,000          | Survey at Agua Hedionda Lagoon                                     |
| Santa Ana RWQCB                               | Cleanup and Abatement Fund                          | \$ 100,000          | Survey and Treatment at Huntington Harbour                         |
| Santa Ana RWQCB                               | Cleanup and Abatement Fund                          | \$ 600,000          | Survey and Treatment at Huntington Harbour                         |
| Southern California Wetlands Recovery Project | Grant to Agua Hedionda Lagoon Foundation            | \$ 1,300,000        | Survey at Agua Hedionda Lagoon and Outreach and Education          |
| US Environmental Protection Agency/SWRCB      | 319h Grant to Agua Hedionda Lagoon Foundation       | \$ 500,000          | Survey at Agua Hedionda Lagoon and Outreach and Education          |
| US Environmental Protection Agency/SWRCB      | Prop 13 Grant to Agua Hedionda Lagoon Foundation    | \$ 2,211,000        | Surveillance in other southern California waterbodies              |
| US Fish and Wildlife Service                  | Bays and Estuaries Program                          | \$ 118,000          | Survey and Treatment at Agua Hedionda Lagoon                       |
| US Fish and Wildlife Service                  | Aquatic Nuisance Species Task Force                 | \$ 40,000           | Scientific Review of Eradication Program                           |
| <b>TOTAL</b>                                  |   | <b>\$ 7,704,092</b> |  |

Hedionda Lagoon and \$660,000 at Huntington Harbour. However, these figures do not capture extensive additional research, outreach, scientific reviews, surveillance of other sites in southern California, or all remaining work elements including removal of treatment tarps and eradication program reporting. The total of all allocations for response to the discovery of *C. taxifolia* infestations in California covering all elements listed above will be approximately \$7,700,000 upon work completion in 2007.

This funding was provided by the State Water Resources Control Board (through Cleanup and Abatement Account funds, Proposition 13 grants, and an EPA Clean Water Act Section 319h grant), California Coastal Conservancy (Southern California Wetlands Recovery Project grant), California Department of Fish and Game, NOAA National Marine Fisheries Service, Cabrillo Power LLC, U.S. Fish and Wildlife Service, the National Fish and Wildlife Foundation, California Department of Parks and Recreation, the FishAmerica Foundation, the NOAA Community-Based Restoration Program, and the Agua Hedionda Lagoon Foundation.

Additional costs of eradication not accounted for above include the contributions of time and knowledge from all active and historical SCCAT participants, including the California Department of Fish and Game, National Oceanic and Atmospheric Administration National Marine Fisheries Service, the San Diego and Santa Ana Regional Water Quality Control Boards, U.S. Department of Agriculture-Agricultural Research Service, UC Davis, University of California Cooperative Extension, the City of Carlsbad, Agua Hedionda Lagoon Foundation, Cabrillo Power I LLC, M-Rep, Hofman Planning, and the staff of Merkel & Associates.

## **PUBLIC OUTREACH**

Public Outreach was discussed in detail in the preceding section.

## **CONCLUSIONS**

Two goals were identified for this project:

- Goal 1 – Eradicate *Caulerpa taxifolia* from Agua Hedionda Lagoon
- Goal 2 – Prevent new introductions of *Caulerpa* through outreach and education

The first goal was achieved, with eradication declared by the California Department of Fish and Game on July 12, 2006. An extra follow-up survey of the infestation site conducted over one year after the declaration did not detect *Caulerpa* remaining at the site.

The second goal is more difficult to assess. The outreach and education program has an evaluation component that will not be completed until the program's end in mid-2008. Pre-outreach surveys indicate widespread use of *Caulerpa* among aquarium hobbyists, however its use is falling in popularity due to its invasive tendencies in their tanks and the availability of alternatives. Participation in trade shows seems to be an extremely effective, personal, and cost effective method to reach large numbers of serious hobbyists in the region. Feedback from hobbyists is positive and many claim they will reconsider using *Caulerpa*, and certainly handle its disposal more carefully if they continue to use it.

No new infestations of *Caulerpa* in the wild have been reported to date. Extensive surveys of southern Californian bays and harbors were conducted in 2006 and 2007 (under a State Water Resources Control Board, Proposition 13 grant) and no infestations of *Caulerpa* were detected. However, although a site has been surveyed, we have no way of knowing that a new introduction

was not made following the completion of our survey. We also have no way to assess whether we are preventing new introductions with actually searching at-risk areas for such introductions. To have any degree of confidence that new infestations have not arisen as a result of new introductions, surveys of these sites would need to be done regularly.

### **UPCOMING WORK**

The eradication of *C. taxifolia* from Agua Hedionda Lagoon has been completed. Upcoming work will include the removal of a small number of tarps remaining at the site, continuation of the outreach and education program under the Proposition 13 grant and funding from the Santa Ana Regional Water Quality Control Board through June 2008. A study to test eradication methods in high energy environments is also under way under 319h grant Agreement No. 06-121-559-0 between AHLF and SWRCB and will be completed in December 2008.

Unfunded project needs include continuation of the outreach and education program, regular surveillance of the bays and harbors for new infestations of *C. taxifolia* and other invasive *Caulerpa* species, and creation of a fund established specifically for mounting an eradication response to newly detected infestations in the future.

### **LESSONS LEARNED**

Despite tremendous efforts and contributions to the body of knowledge on *C. taxifolia*, a successful eradication of an infestation of the aquarium strain of *C. taxifolia* has never been achieved before now. Reflection on the process results in a long list of lessons learned by the effort, that can be summarized briefly with a list of the critical elements of a successful eradication response: 1) rapid response; 2) assumption and belief that eradication is possible; 3) incorporation of the lessons from other responses; 4) adequate funding to maintain a sustained, persistent response; 5) intensive, repeated surveys over an extended period of time after the last discovery; 6) quantitative evaluation of the effectiveness of survey and treatment elements; 7) identification and engagement of stakeholders; 8) adaptation and adjustment to approach in response to financial circumstances, stakeholder response, or independent review. There is wide agreement that the key elements of the *C. taxifolia* eradication effort were the quick recognition of the threat posed by *C. taxifolia*, prompt organization of a response team, effective acquisition of funding, and an immediate field response to assess the extent of the infestation and develop a response plan.

Unfortunately, new introductions of *C. taxifolia* may occur in California's waters because despite restrictions, *C. taxifolia* is still available in other states and continues to be used in California. It is critical that the lessons learned from this eradication effort be recognized in order to respond appropriately and effectively when the next infestation is discovered. Hopefully outreach and education efforts will help prevent new introductions and existing infestations will be detected quickly while there is still time to respond.

**LIST OF DELIVERABLES**

All deliverables required by Section C of Agreement Exhibit A-1 are listed below and have been included on the Compendium of Results and Deliverables CD attached to this document.

- 1.1 Administrative Documents (procurement policies and invoices)
- 1.2 Quarterly Progress Reports
- 1.5 Contract Summary Form
- 1.6 MBE/WBE Documentation
- 1.7 Subcontractor Agreements
- 1.8 NRPI Project Survey Form
- 2.1 CEQA Documentation
- 3.1.1 Survey Protocol
- 3.1.2 QA-QC Report
- 3.1.7 Tarp Removal Maps
- 3.2.1 SCCAT Surveillance and Eradication Update- Meeting Presentation Slides
- 3.2.2 Community Presentations and Signs
- 3.3.2 Survey Maps and Photo Archive
- 3.3.3 Additional Data Requested – Final Eradication Report
- 3.4.1 Email Updates
- 3.4.2 Quarterly Reports
- 3.4.3 Annual Reports
- 4.1 Outreach Presentation Materials for SCCAT Meetings
- 4.2 Plan for Outreach and Education Program
- 4.3 Outreach Materials
- 4.5 Email Updates

A table summarizing the due date and date of submittal is included below.

| <u>Task</u>                | <u>Deliverable</u>             | <u>Due Date</u> | <u>Date Submitted</u>  |
|----------------------------|--------------------------------|-----------------|--|
| 1.0 Project Administration | 1.2 Quarterly Progress Reports | 1/10/05 & QTA   | 2/18/08<br>10/11/07<br>7/11/07<br>4/12/07<br>1/16/07<br>10/11/06<br>7/11/06<br>4/7/06<br>1/12/06<br>10/11/05<br>7/29/05<br>7/11/05<br>4/11/05<br>1/25/05 |
|                            | 1.5 Contract Summary Form      | 10/10/04        | 1/25/05  |
|                            | 1.6 MBE/WBE Documentation      | 1/10/05 & QTA   | 2/18/08<br>10/11/07<br>7/11/07<br>4/12/07<br>1/16/07   |

|                                  |  |               |   |
|----------------------------------|--|---------------|---|
|                                  |  |               | 10/11/06<br>7/11/06<br>4/7/06<br>1/12/06<br>10/11/05<br>7/11/05<br>4/11/05<br>1/25/05   |
|                                  | 1.7 Solicitation Documentation                       | 10/10/04      | 1/25/05   |
|                                  | 1.8 Project Survey Form                              | 11/30/07      | 2/18/08   |
| 2.0 CEQA Documents & Permits     | 2.1 CEQA Documentation                               | 10/10/04      | 1/25/05   |
|                                  | 2.2 Signed Coversheets for All Permits               | 10/10/04      | 1/25/05   |
| 3.0 Surveillance and Eradication | 3.1.1 Approved Survey Protocol                       | 1/10/05       | 1/25/05   |
|                                  | 3.1.2 Approved QA/QC Report                          | 1/10/05       | 1/25/05   |
|                                  | 3.2.1 SCCAT Surveillance and Eradication Update      | 1/10/05 & QTA | 2/18/08<br>7/11/07<br>4/12/07<br>1/16/07<br>10/11/06<br>7/11/06<br>4/7/06<br>1/12/06<br>10/11/05<br>7/11/05<br>4/11/05<br>1/25/05             |
|                                  | 3.2.2 Presentation Materials from Community Meetings | 1/10/05 & QTA | 7/11/06<br>1/25/05  |
|                                  | 3.3.2 Survey Maps                                    | 1/10/05 & QTA | 2/18/08<br>4/7/06<br>1/12/06<br>10/11/05<br>7/11/05<br>4/11/05<br>1/25/05   |
|                                  | 3.4.1 Email Status Reports                           | 1/10/05 & QTA | 2/18/08<br>10/11/07<br>7/11/07<br>4/12/07<br>1/16/07<br>10/11/06<br>7/11/06<br>4/7/06<br>1/12/06<br>10/11/05<br>7/11/05<br>4/11/05<br>1/25/05 |
|                                  | 3.4.2 Quarterly Project Reports                      | 1/10/05 & QTA | 2/18/08<br>10/11/07<br>7/11/07<br>4/12/07   |

|                                     |   |               |   |
|-------------------------------------|---|---------------|---|
|                                     |   |               | 1/16/07<br>10/11/06<br>7/11/06<br>4/7/06<br>1/13/06<br>10/11/05<br>7/11/05<br>4/11/05<br>1/25/05                        |
|                                     | 3.4.3 Annual Project Reports            | 1/10/05 & ATA | 7/11/07<br>4/7/06<br>4/11/05  |
| 4.0 Outreach and Education          | 4.1 Presentation Materials for SCCAT    | 1/10/05 & QTA | 2/18/08<br>7/11/07<br>4/12/07<br>10/11/06<br>7/11/06<br>1/12/06<br>10/11/05<br>7/29/05<br>4/11/05<br>1/25/05            |
|                                     | 4.2 Outreach Plan                       | 1/10/05       | 10/11/05  |
|                                     | 4.3 Copies of Outreach Materials        | 1/10/05 & QTA | 2/18/08<br>10/11/07<br>4/12/07<br>1/16/07<br>10/11/06<br>7/11/06  |
|                                     | 4.5 Email status reports/Annual Reports | 1/10/06 & QTA | 2/18/08<br>10/11/07<br>7/11/07<br>4/12/07<br>1/16/07<br>10/11/06<br>7/11/06<br>4/7/06<br>1/12/06<br>10/11/05<br>7/11/05 |
| 5.0 Draft and Final Project Reports | 5.2 Draft Project Report                | 10/30/07      | 12/31/07  |
|                                     | 5.3 Final Project Report                | 11/30/07      | 2/18/08   |

*Funding for this project has been provided in part by the U.S. EPA pursuant to Assistance Agreement No. C9-9768201-0 and any amendments thereto which has been awarded to the State Water Resources Control Board (SWRCB) for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the USEPA or the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.*

**APPENDIX**

Aquarium Maintenance Providers Database.xls

| Name                                    | Address  | Phone #  | County      | Contact Log                        |
|---|--|--|-------------|------------------------------------|
| Advanced Aquatics                       | 10622 Sunset Ridge Dr. San Diego, CA 92116           | 760-291-1728                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Affordable Aquarium Service             | 530 W Julianna Ave. Long Beach, CA 90801             | 714-493-4205                                   | Orange      | letter returned                    |
| Age of Aquariums                        | 266 Grand Avenue, Long Beach, CA 90801               | 562-438-6252                                   | Los Angeles | letter returned                    |
| America's Aquarium Design               | 26895 Aliso Creek Rd., Suite B Aliso Viejo, CA 92606 | 949-362-8801                                   | Orange      | Resent letter 11/7/07              |
| Aqua Designs by Fishmaxx                | 153 Autumn Leaf Mission Viejo, CA 92691              | 949-305-4444                                   | Orange      | letter returned                    |
| Aqua Knowledge                          | Costa Mesa CA  | 714-506-1257                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Aqua Tech                               | 1263 Linda Vista Dr. San Marcos, CA 92078            | 760-744-7535                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aqua-C Incorporated                     | 7949 Stromesa Court San Diego, CA 92121              | (858) 689-1121                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquadan Aquarium Maintenance            | 7301 Lennox Ave. Van Nuys, CA 91405                  | 818-909-7719                                   | Los Angeles | letter returned                    |
| Aqua-Marine                             | 317 Isis Ave. Inglewood, CA 90301                    | 310-410-4408                                   | Los Angeles | letter returned                    |
| Aquari-Lease                            | 3404 Newell St. San Diego, CA 92106                  | 619-247-2654                                   | San Diego   | Resent letter 11/7/07              |
| Aquarium Art                            | 12985 Dear Canyon Ct. San Diego, CA 92130            | 858-505-8777                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquarium Center                         | 14255 Ventura Blvd. Sherman Oaks, CA 91408           | 818-501-3544                                   | Los Angeles | letter returned                    |
| Aquarium Design                         | 2925 Calle Quebracho Thousand Oaks, CA 91320         | 805-241-7140, contact@aquarium-design.com      | Los Angeles | Resent letter 11/7/07              |
| Aquarium Doctor                         | 9151 Atlanta Ave. #6595 Huntington Beach, CA 92646   | 714-536-3600                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Aquarium Maintenance by Chip & Fish Art | 4039 Brant St. San Diego, CA 92103                   | 619-861-2886                                   | San Diego   | letter returned                    |
| Aquarium Masters                        | 5672 Middlecoff Dr. Huntington Beach, CA 92646       | 714-960-6527                                   | Orange      | letter returned                    |
| Aquarium Sales & Rentals                | 16760 Stagg #217 Van Nuys, CA 91406                  | 818-780-9310                                   | Los Angeles | letter returned                    |
| Aquarium Service by Wally               | 11092 Yana Dr. Garden Grove, CA 92841                | 714-638-8757                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Aquarium Solutions                      | 2602 E. Jacaranda Ave. Orange, CA 92867              | 714-538-8393                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Aquarium Stock Company                  | 8070 Beverly Blvd. Los Angeles, CA 90048             | 323-653-8930                                   | Los Angeles | letter returned                    |
| Aquarium Systems by Innerspace          | P.O. Box 305 Lomita, CA 90717                        | 310-534-2166                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Aquatic Design Systems Inc.             | 6970 Convoy Ct. San Diego, CA 92111                  | 858-636-7990                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquatic Illusions                       | PMB 159 8030 La Mesa Blvd La Mesa, CA 91941-6435     | (619) 583-8822                                 | San Diego   | letter returned                    |
| Aquatic Life Services                   | 24671 Highway 78 Ramona, CA 92065                    | 760-789-3311                                   | San Diego   | Resent letter 11/7/07              |
| Aquatic Perfection                      | 1590 Avenida De Los Lirios Carlsbad, CA 92024        | 760-930-0359, 760-364-2044                     | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquatic Systems                         | 34515 Calle Naranja Capistrano Beach, CA 92026       | 949-496-4807                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Aqu-Terra, Aquatic Art                  | 16685 Calneva Dr. Encino, CA 91436                   | 818-501-7333                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Artistic Aquarium                       | Mission Viejo CA 92691                               | 949-770-6663                                   | Orange      |                                    |
| Atlantis Aquarium & Pond Service        |  | 818-781-5905                                   |             |                                    |
| B.C. Reef Aquarium Maintenance          | P.O. Box 131 Culver City, CA 90232                   | 800-497-7333, ClaudeKelly@bcreef.com           |             | Letter w/fact sheet mailed 9.27.07 |
| Belizian Coral Reef                     | 3993 S Bronson Ave. Los Angeles, CA 90008            | 323-291-0700                                   |             | letter returned                    |
| California Aquatics                     | 10161 Buena Vista Ave Santee, CA 92071               | 619-523-1913                                   | San Diego   | Resent letter 11/7/07              |
| Coastal Aquarium Concepts               | 4460 Whitepine Way Oceanside, CA 92053               | (760) 525-3493                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Coral Reef Enterprises                  | 7625 Hayvenhurst Ave. Van Nuys, CA 91411             | 818-997-7033                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Dales Mobile Aquarium Service           | 501 Avalon Dr. Vista, CA 92084                       | (760) 716-3902                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Encinitas Tropical Aquarium Service     | 10837 Hillbrae Ct. San Diego, CA 92121               | (760) 613-9372                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Fish Art Sophisticated Aquarium Designs | 20201 Prairie St., Unit F Chatsworth, CA 91311       | 818-993-7541                                   |             | Letter w/fact sheet mailed 9.27.07 |
| Fish By Design                          | 1897 Obispo Ave. Signal Hill, CA 90804               | 562-597-6986                                   | Los Angeles | letter returned                    |
| Fish on the Wall                        | 4901 Melrose Ave. Los Angeles, CA 90029              | 323-468-0103                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Fish Physician                          | 17206 Vose St. Van Nuys, CA 91406                    | 818-342-6416                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Fishman                                 | 4943 McConnell Ave. Los Angeles, CA 90008            | 310-822-7870                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Fishmax                                 | 10537 Ellis Ave. Fountain Valley, CA 92708           | 714-964-9207, 949-305-4444                     | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Fishy Business                          | 10635 Roselle St., Suite C San Diego, CA 92116       | 858-202-1557                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Georgias Tropical Fish                  | 519 W. 7th St. Long Beach, CA 90813                  | 562-432-4908                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Gold Coast Aquarium Service             | 1259 South Wright St. Santa Ana, CA 92707            | 949-831-8649                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Greenwood Aquatics                      | Santa Ana CA   | 323-633-3208                                   | Los Angeles |                                    |
| Hawaii Sea Scapes                       | 4847 W. Rosecrans Ave. Hawthorne, CA 90330           | 310-978-8543                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| It's a Fishie Business Aquarium Service | 12415 Lithuania Dr. Granada Hills, CA 91344          | 818-363-7279                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| It's Fishy Pets                         | 5814 Andros Ct. San Diego, CA 92115                  | 619-287-3350                                   | San Diego   | letter returned                    |
| Jellys by Johnson                       | 3466 Aveyley Pl. San Diego, CA 92111                 | 858-571-0976                                   | San Diego   | letter returned                    |
| Koiabunga                               | 3741 Rose Dr. Yorba Linda, CA 92886                  | 714-579-1115                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Live Water Aquariums and Ponds          | 6161 El Cajon Blvd # 102 San Diego, CA 92114         | (619) 993-0277                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Marine Life Services                    | Culver city, Ca                                      | 310-621-6065                                   | Los Angeles |                                    |
| Nouveau Marine                          | P.O. Box 10534 Beverly Hills, CA 90213               | 323-658-7340                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Ocean Galleries                         | P.O. Box 773 Trabuco Canyon, CA 92578                | 949-584-2366, 949-951-6377                     | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Oranda Aquarium                         | 7317 1/2 Santa Monica Blvd. Los Angeles, CA 90045    | 323-876-5059                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Pacific Pond & Aquarium                 | 7921 Canoga Avenue, Unit I Canoga Park, CA 91304     | 818-970-7957                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Piscean Environments                    | 3537 Redwood Ave. Los Angeles, CA 90008              | 310-391-8984                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Reef Systems Inc.                       | 2931 Grace Ln., Suite G Costa Mesa, CA 92626         | 714-751-3474                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| Real Ocean Aquarium Co.                 | 2060 W. La Habra Blvd. La Habra, CA 90631            | 562-694-4672                                   | Orange      | letter returned                    |
| Rich's Aquarium Service & Supply        | 791 Newton Way Costa Mesa, CA 92627                  | 714-545-2889                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| San Diego Aquarium Service              | Carlsbad, CA 92008                                   | 858-663-1843, info@sandiegoaquariumservice.com | San Diego   |                                    |
| Savage Sea's Aquarium Design            | 26701 Quail Creek, # 278, Laguna Hills, CA 92653     | 949-362-8801                                   | Orange      | Resent letter 11/7/07              |
| Sealine Reef                            | 6256 Golden West Ave. Temple City, CA 91781          | 800-350-3972                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Southbay Aquarium Service               | 154 E. Genevieve St. Carson, CA 90745                | 310-323-5927                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| The Aquarium Man                        | P.O. Box 829 Corona Del Mar, CA 92625                | 949-642-4624                                   | Orange      | Letter w/fact sheet mailed 9.27.07 |
| The Fish Doctor                         | 1740 Grand Ave. San Diego, CA 92109                  | 619-850-6653                                   | San Diego   | letter returned                    |
| The Fish King                           | 788 West 16th St. Costa Mesa, CA 92627               | 949-642-7258                                   | Orange      | Resent letter 11/7/07.             |
| The Reef Room                           | 34085 Pacific Coast Hwy. Dana Point, CA 92629        | 949-248-3333                                   | Orange      | Letter returned again 11/26/07.    |
| Tropical Fish Consolidators Limited     | 1265 Dunwich Ave. Torrance, CA 90502                 | 310-677-9185                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Under the Sea                           | 5622 La Jolla Blvd. La Jolla, CA 92037               | 858-405-6964                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Under the Sea                           | P.O. Box 421474 Los Angeles, CA 90042                | 323-478-9835                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Underwater Depot                        | 13708 Ventura Blvd. Sherman Oaks, CA 91408           | 818-789-7323                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Universal Aquarium Systems Inc          | 1620 Beacon Place Oxnard, CA 93033                   | 805-486-2614                                   |             | Letter w/fact sheet mailed 9.27.07 |
| Vermont Tropical Fish                   | 923 S. Vermont Ave. Los Angeles, CA 90008            | 213-388-2821                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| VM Aquatics                             | 4344 Convoy St., Suite N. San Diego, CA 92111        | 858-694-8166                                   | San Diego   | letter returned                    |
| West Coast Aquarium Industries          | 7194 Clairemont Mesa Blvd. San Diego, CA 92108       | 858-571-3474                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| West Coast Aquarium Supply Co.          | 7252 Reseda Blvd. Reseda, CA 91335                   | 818-881-2833                                   | Los Angeles | Letter w/fact sheet mailed 9.27.07 |
| Aquamant Aquarium Services              | P.O. Box 411 Carlsbad, CA 92018                      | (760) 434-9000                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquatic Pets Aquarium & Pond Service    | 25286 Manzanita Ln. Descanso, CA 92025               | (619) 659-8900                                 | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Aquatic Equipment and Services- NO SALT | 2232 Verus St. San Diego, CA 92154                   | 619-439-9160                                   | San Diego   | letter returned                    |
| Clearwater Aquarium Services            | P.O. Box 261194 San Diego, CA 92196-1194             | 858-395-6919                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Innovative Aquarium Systems             | 3710 Wabash Ave., Unit 202 San Diego, CA 92104       | 619-726-4988                                   | San Diego   | Letter w/fact sheet mailed 9.27.07 |
| Premier Aquatics                        | 5700 Baltimore Dr. La Mesa, CA 91942                 | 619-464-5300                                   | San Diego   | letter returned                    |

| <b>Name</b>                                     | <b>Address</b>  | <b>Phone #</b> | <b>County</b>      |
|---|---|----------------|--------------------|
| <b>ABC Tropical Fish</b>                        | 11511 Washington Blvd., Whittier CA 90606               | 562-692-2155   | Los Angeles County |
| <b>Advanced Aquatics Tropical Fish</b>          | 23655 San Fernando Rd., Santa Clarita, CA 91321         | 661-255-2058   | Los Angeles County |
| <b>Amer Aqua Imports, Inc.</b>                  | 3732 West Century Blvd., Inglewood CA 90303             | 310-680-9746   | Los Angeles County |
| <b>Angels Tropical Fish</b>                     | 847 North Lake Avenue, Pasadena CA 91104                | 626-798-3473   | Los Angeles County |
| <b>Aquarium Arts</b>                            | 11160 Hindry Ave., Los Angeles CA 90045                 | 310-649-1517   | Los Angeles County |
| <b>Aquarium City</b>                            | 21723 Sherman Way, Canoga Park CA 91303                 | 818-887-7369   | Los Angeles County |
| <b>Aquatic Fantasy</b>                          | 531 North Pacific Coast Highway Redondo Beach, CA 90277 | 310-798-7333   | Los Angeles County |
| <b>Aquatic Fish &amp; Tank</b>                  | 5220 4th St. Baldwin Park, CA 91706                     | 626-813-7799   | Los Angeles County |
| <b>Aquatic Outlet Wholesale Warehouse</b>       | 427 Hindry Ave. Inglewood, CA 90301                     | 310-641-4664   | Los Angeles County |
| <b>Atlantic Tropical</b>                        | 18343 Pioneer Blvd. Artesia, CA 90701                   | 562-924-7567   | Los Angeles County |
| <b>BLM Aquatic Supply</b>                       | 633 Hindry Ave., Inglewood CA 90301                     | 310-645-0366   | Los Angeles County |
| <b>Bob's Tropical Fish</b>                      | 234 S. Atlantic Blvd. Los Angeles, CA 90022             | 323-261-6675   | Los Angeles County |
| <b>C &amp; C Aquatics</b>                       | 21724 Sherman Way Canoga Park, CA 91303                 | 818-340-9923   | Los Angeles County |
| <b>Carson Tropical Fish</b>                     | 12119 Carson St. Hawaiian Gardens, CA 90716             | 562-924-7685   | Los Angeles County |
| <b>Cathay Aquarium</b>                          | 21 West Main St. Alhambra, CA 91801                     | 626-282-3735   | Los Angeles County |
| <b>Circle Pet &amp; Tropical Fish Center</b>    | 1940 Ximeno Ave., Long Beach CA 90815                   | 562-597-0619   | Los Angeles County |
| <b>Crystal Clear Aquarium &amp; Pet Service</b> | 344 North Griffith Park Dr., Burbank CA 91506           | 818-508-6868   | Los Angeles County |
| <b>Exotic Tropical Fish</b>                     | 6961 Hayvenhurst Ave. Van Nuys, CA 91406                | 818-780-7327   | Los Angeles County |
| <b>Fish Cove</b>                                | 3900 Foothill Blvd., La Crescenta CA 91214              | 818-249-7518   | Los Angeles County |

| <b>Name</b>                                | <b>Address</b>   | <b>Phone #</b> | <b>County</b>      |
|--|--|----------------|--------------------|
| <b>Fish in the Bag</b>                     | 1210 West 134th St., Gardena, CA 90247                 | 310-329-0883   | Los Angeles County |
| <b>Fish Pond</b>                           | 12459 Oxnard St., North Hollywood CA 91606             | 818-766-8343   | Los Angeles County |
| <b>Fish Tale</b>                           | 4364 Fountain Ave. Los Angeles, CA 90029               | 323-665-0350   | Los Angeles County |
| <b>Fish Wonders</b>                        | 526 Pacific Coast Highway Hermosa Beach, CA 90254      | 310-374-0361   | Los Angeles County |
| <b>Fumi's Tropical Fish</b>                | 17606 Chatsworth, Granada Hills CA 91344               | 818-363-3710   | Los Angeles County |
| <b>Grand Tropical Fish</b>                 | 930 South Grand Ave., Glendora CA 91740                | 626-963-0517   | Los Angeles County |
| <b>Hacienda Aquatics</b>                   | 1075 North Hacienda Blvd., La Puente CA 91744          | 626-330-4716   | Los Angeles County |
| <b>Hong Kong Tropical Fish</b>             | 18828 Norwalk Blvd. Artesia, CA 90701                  | 562-402-7128   | Los Angeles County |
| <b>Indorica Fish</b>                       | 590 North Laurel Valley Dr Azusa, CA 91702             | 626-334-6211   | Los Angeles County |
| <b>James Tropical Fish</b>                 | 4273 Crenshaw Blvd. Los Angeles, CA 90008              | 323-294-6490   | Los Angeles County |
| <b>Jim's Exotic Fish</b>                   | 630 North Sepulveda El Segundo, CA 90245               | 310-322-3474   | Los Angeles County |
| <b>Kyoto Aquarium</b>                      | 3952 Wilshire Blvd. Los Angeles, CA 90010              | 213-487-7302   | Los Angeles County |
| <b>LA Tropical Fish Pet &amp; Supplies</b> | 1373 West Sunset Blvd. Los Angeles, CA 90026           | 213-482-9131   | Los Angeles County |
| <b>Lees Aquarium</b>                       | 319 East Garvey Ave.<br>Monterey Park, CA 91755        | 626-571-4982   | Los Angeles County |
| <b>Mark's Tropical Fish</b>                | 12063 Ventura Place, Studio City CA 91604              | 818-762-7700   | Los Angeles County |
| <b>Neptunes Tropical Fish</b>              | 4817 Paramount Blvd.<br>Lakewood, CA 90712             | 562-423-8280   | Los Angeles County |
| <b>ORCA Aquatics</b>                       | 377 West 7th Street, San Pedro CA 90731                | 310-519-7366   | Los Angeles County |
| <b>Pacific Aquatics West</b>               | 21413 Devonshire St.<br>Chatsworth, CA 91311           | 818-886-6083   | Los Angeles County |
| <b>Parkway Tropical Fish</b>               | 4200 Chino Hills Pkwy. Suite 835, Chino Hills CA 91709 | 909-393-3803   | Los Angeles County |

| <b>Name</b>                          | <b>Address</b>                                   | <b>Phone #</b> | <b>County</b>      |
|--------------------------------------|--|----------------|--------------------|
| <b>Pasadena Tropical Fish</b>        | 2982 E. Colorado Blvd. #108, Pasadena CA 91107   | 626-449-4987   | Los Angeles County |
| <b>Pet Boy's Tropical Fish</b>       | 3720 N. Vertugo Rd., #6<br>Montrose, CA 91020    | 818-249-9259   | Los Angeles County |
| <b>Rosemead Aquarium</b>             | 9123 Valley Blvd.<br>Rosemead, CA 91770          | 626-287-5083   | Los Angeles County |
| <b>Seven Seas Tropical Fish</b>      | 1707 S. Gaffey St.,<br>San Pedro, CA 90731       | 310-832-5339   | Los Angeles County |
| <b>Seven Seas Tropical Fish</b>      | 5472 East Del Amo Blvd.<br>Long Beach, CA 90808  | 562-421-9519   | Los Angeles County |
| <b>Tikis Tropical Fish</b>           | 9711 Alondra Blvd.<br>Bellflower, CA 90706       | 562-925-2620   | Los Angeles County |
| <b>Tokyo Aquarium</b>                | 4600 West Adams Blvd.<br>Los Angeles, CA 90016   | 323-735-7553   | Los Angeles County |
| <b>Tong's Tropical Fish</b>          | 4327 South Vermont<br>Los Angeles, CA 90037      | 323-235-4370   | Los Angeles County |
| <b>Tong's Tropical Fish</b>          | 410 North Azusa Ave.<br>West Covina, CA 91791    | 626-967-7020   | Los Angeles County |
| <b>Tropical Fish Aquarium Center</b> | 14255 Ventura Blvd.<br>Sherman Oaks, CA 91423    | 818-501-3544   | Los Angeles County |
| <b>Tropical Imports</b>              | 1134 East Colorado St.<br>Glendale, CA 91205     | 818-240-9356   | Los Angeles County |
| <b>Tropical Reef</b>                 | 3110 Pacific Coast Hwy<br>Torrance, CA 90505     | 310-539-7902   | Los Angeles County |
| <b>Underwater World Enterprises</b>  | 5242 West 104th St.<br>Los Angeles, CA 90045     | 310-670-1502   | Los Angeles County |
| <b>Vivid Aquariums</b>               | 21126 Vanowen Street, Canoga Park, CA 91313      | 818-348-3288   | Los Angeles County |
| <b>Yo's Aquarium</b>                 | 5546 Santa Monica Blvd.<br>Los Angeles, CA 90038 | 323-871-2730   | Los Angeles County |

| <b>Name</b>                              | <b>Address</b>                                   | <b>Phone #</b>            | <b>County</b> |
|--|--|---------------------------|---------------|
| <b>405 Tropical Fish</b>                 | 15222 Goldenwest St., Westminster CA 92683       | 714-373-0777              | Orange County |
| <b>Black Coral, Inc.</b>                 | 2941 W. Central Ave., Unit A Santa Ana, CA 92704 | 714-754-6368              | Orange County |
| <b>Coral Island</b>                      | 1711 W. Chapman Ave., Orange CA 92868            | 714-939-8797              | Orange County |
| <b>Fish 2000</b>                         | 13011 Newport Ave., Suite 112, Tustin CA 92780   | 714-838-1862              | Orange County |
| <b>Fish Collection</b>                   | 1158 E. Yorba Linda Bl. Placentia, CA 92670      | 714-761-1436              | Orange County |
| <b>Imperial Tropical Fish &amp; Pets</b> | 704 East Imperial Highway, Brea CA 92821         | 714-255-0978              | Orange County |
| <b>New Wave Tropical Fish</b>            | 1960 N. Tustin St.<br>Orange, CA 92865           | 714-998-8209 or 998-8289  | Orange County |
| <b>OC Aquatic Tropical Fish</b>          | 10110 Adams Ave., Huntington Beach CA 92646      | 714-965-7888              | Orange County |
| <b>Orange Coast Tropical Fish</b>        | 6881 Western Ave<br>Buena Park, CA 90621         | 714-523-1003              | Orange County |
| <b>P&amp;P Tropical Fish</b>             | 5020 Ball Rd.<br>Cypress, CA 90630               | 714-828-3872              | Orange County |
| <b>Pacific Reef Tropical Fish</b>        | 2877 W. Lincoln Ave.<br>Anaheim, CA 92801        | 714-821-8000              | Orange County |
| <b>Strictly Fish</b>                     | 6903 Carson St., Lakewood CA 90713               | 714-750-7151/562-421-9106 | Orange County |
| <b>Tong's Tropical Fish</b>              | 8976 Warner Avenue, Fountain Valley CA 92708     | 714-842-2733              | Orange County |
| <b>West Lake Aquarium</b>                | 710 East Whittier Blvd.<br>La Habra, CA 90631    | 562-694-3335              | Orange County |

| <b>Name</b>                           | <b>Address</b>                                   | <b>Phone #</b> | <b>County</b>    |
|---------------------------------------|--|----------------|------------------|
| <b>Aquarium Paradise</b>              | 3379 Adams Ave, San Diego, CA 92116              | 619-528-1913   | San Diego County |
| <b>Aquatic Warehouse</b>              | 5466 Complex St., Suite 204, San Diego CA 92111  | 858-467-9297   | San Diego County |
| <b>Bailey Wholesale Tropical Fish</b> | 5151 Santa Fe St., Ste 1 San Diego, CA 92109     | 619-275-6793   | San Diego County |
| <b>Encinitas Tropical Fish</b>        | 378 North El Camino Real, Encinitas CA 92024     | 760-634-2427   | San Diego County |
| <b>Fish Heaven</b>                    | 2203 E. Valley Parkway, Escondido CA 92027       | 760-741-1525   | San Diego County |
| <b>Fountains Aquarium</b>             | 7575 University Ave. La Mesa, CA 91141           | 619-465-5333   | San Diego County |
| <b>Goldfish World</b>                 | 3860 Convoy St. San Diego, CA 92111              | 858-541-7878   | San Diego County |
| <b>Octopuss' Garden</b>               | 4865 Convoy Rd.<br>San Diego, CA 92111           | 858-576-7449   | San Diego County |
| <b>South Bay Tropicals</b>            | 1172 3rd Ave., Suite D6<br>Chula Vista, CA 91911 | 619-585-3641   | San Diego County |
| <b>Tri-City Tropical Fish</b>         | 1920 Hacienda Dr., Vista CA 92083                | 760-631-1532   | San Diego County |