

August 20, 1997

Governor Pete Wilson
First Floor, State Capitol
Sacramento, CA 95814

Secretary Douglas P. Wheeler
The Resources Agency
1416 9th Street
Sacramento, CA 95814

Director Jacqueline E. Schafer
California Department of Fish and Game
1416 9th Street
Sacramento, CA 95814

Dear Governor Wilson, Secretary Wheeler and Director Schafer,

We are scientists with research experience in marine ecology and/or biological invasions. We write to urge you to take needed action to reduce the risk of introducing non-indigenous parasites, diseases and other organisms into California waters via aquaculture activities. This threat, and the need for a more effective government response, is demonstrated by the ongoing release of the parasitic African sabellid worm into California coastal waters by the commercial abalone farming industry, and by CDFG's tardy and still inadequate response to this problem.

The African sabellid worm was introduced into California abalone farms by the mid- to late-1980s with imported South African abalone. These worms infest and weaken the shells of California abalone, reducing growth rates and production, and causing deformities. Experiments by Carrie Culver and Armand Kuris at U. C. Santa Barbara show that these worms can infest many types of native marine snails, not just abalone.

Infested abalone were freely transferred between facilities, spreading the African worm to virtually all California abalone farms by 1993, with the resulting infestations bankrupting some growers. In 1994 researchers determined that the problem was caused by a non-indigenous parasite. However, CDFG took no action whatsoever to prevent the release of this parasite into California waters until December 1996, when CDFG notified growers that it would be stopping the direct out-planting of abalone into California waters; requiring screens on pipes that discharge water from on-shore abalone farms into the ocean; requiring growers that rear abalone in cages and barrels in the ocean to stop dumping empty shells, kelp and other debris that may harbor worms into the ocean; and requiring growers to notify CDFG when abalone were being transferred between facilities, so that CDFG could inspect the shipments. CDFG also stated that it would not issue a 1997 aquaculture registration to any grower who did not have an approved plan for eradicating the worm. As of this writing, however, no plans have yet been approved.

More recently, CDFG issued a press release claiming that it is requiring the "complete eradication of sabellid infestations from all aquaculture facilities." However, CDFG has not yet set any deadlines for achieving this goal, while it continues to allow practices that virtually guarantee the ongoing release of the African worm. Growers may continue rearing infested abalone in cages and barrels in the ocean, which freely releases larval worms into the environment. Screened discharges from on-shore facilities, although greatly minimizing the release of adult worms, may still carry larval worms into the ocean. In addition, some growers are attempting to cleanse their facilities by selling off their infected stock; the worm may then be released into the ocean via unscreened discharges from the holding tanks of live seafood distributors or retailers, or by discarded shells.

As worrisome as this situation is, such gaps in management are unfortunately not confined to the sabellid worm problem or to the abalone industry. Aquaculture activities in general are inadequately regulated to prevent the introduction of harmful non-indigenous organisms into the California environment. On numerous occasions, in many parts of the world, aquaculture activities have imported and released harmful parasites, diseases and predators with devastating effect on fish and shellfish populations. Outbreaks of diseases and parasites have also been reported from California aquaculture facilities, which are often poorly isolated from the environment.

We believe that CDFG's management of aquaculture should be based on the following principles:

- Aquaculture facilities should be responsible for conducting their activities so as to prevent the accidental release of non-indigenous organisms.
- Aquaculture should whenever possible be based on native, local stock.
- Importing stock and transferring stock between regions should be minimized, and any transfers should be thoroughly inspected for non-indigenous organisms.
- Stock infested with non-indigenous organisms should be kept thoroughly isolated from the environment. If such isolation is impossible, the stock should be destroyed.
- Parasites or disease syndromes found in aquaculture stocks that are not known from the local environment should be managed as non-indigenous organisms.
- Proposals to import non-indigenous organisms for aquaculture purposes should receive complete public review before such imports are allowed.
- Participation on CDFG advisory bodies or committees that deal with aquaculture management should not be limited to members of the aquaculture industry, but should include parties that could be affected by the release of non-indigenous organisms, such as sport and commercial harvesters and environmental protection organizations, along with independent scientists familiar with the affected environment or with expertise in biological invasions.

In 1996 researchers found the African sabellid worm established in the ocean in California at a site adjacent to an abalone farm. In South African waters the worm sometimes achieves high abundance. If it becomes as abundant in California, its ability to infest and harm a variety of native marine snails could have a substantial impact on California's marine ecosystems. We urge you to take immediate steps both to manage

this particular parasite, and to institute changes in the overall management of aquaculture that are needed to protect the California environment from future introductions of harmful exotic organisms.

Sincerely,

Andrew N. Cohen
Environmental Scientist
San Francisco Estuary Institute
Richmond, CA 94804
(510) 231-9423

Carrie Culver
Marine Science Institute
University of California
Santa Barbara, CA 93106
(805) 893-3998

Armand Kuris
Professor of Zoology
Marine Science Institute
University of California
Santa Barbara, CA 93106
(805) 893-3998

James T. Carlton
Professor of Marine Sciences
Director, Maritime Studies Program
Williams College-Mystic Seaport
Mystic, CT 06355
(860) 572-5359

Walter R. Courtenay, Jr.
Prof. of Zoology & Assistant Chair
Department of Biological Sciences
Florida Atlantic University
Boca Raton, FL 33431-0991

Paul K. Dayton
Professor of Oceanography
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093

Jed Fuhrman
McCulloch-Crosby Chair of
Marine Biology
University of Southern California
Los Angeles, CA 90089-0371
(213) 740-5757

Harold A. Mooney
Professor of Biological Sciences
Stanford University
Stanford, CA 94305-5020
(415) 723-1179

Peter B. Moyle
Professor of Fish Biology
University of California, Davis
Davis CA 95616
(916) 752-6355

Robert T. Paine
Professor of Zoology
University of Washington
Seattle, WA 98195-1800
(206) 685-8615

Dennis A. Powers
Director, Hopkins Marine Station
Professor of Biological Sciences
Stanford University
Pacific Grove, CA 93950
(408)655-6214

Richard Strathmann
Professor of Zoology
University of Washington
Friday Harbor Laboratory
Friday Harbor, WA 98250

Donald R. Strong
Professor of Biological Sciences
Bodega Marine Laboratory
University of California, Davis
Bodega, CA 94923
(707) 875-2022

Geerat J. Vermeij
Professor of Geology
University of California, Davis
Davis CA 95616

Judith S. Weis
Professor of Marine Biology
Department of Biological Sciences
Rutgers University
Newark, NJ 07102

Richard F. Ambrose
Associate Professor
Envi. Science and Engineering
University of California
Los Angeles, CA 90095-1772
(310) 825-6144

American Malacological Union
by Robert H. Cowie, Chair of the
Conservation Committee
Honolulu, HI 96817
(808) 848 4118

Lars W. J. Anderson
Research Leader
USDA-ARS Aquatic Weed
Control Laboratory
University of California
Davis, CA 95616

Ronald S. Burton
Professor of Marine Biology
Scripps Institution of Oceanography
La Jolla, CA 92093-0202
(619) 534-7827

Diane Carney
Researcher
Moss Landing Marine Laboratories
Moss Landing, CA 95039

Linda J. Cayot
Coordinator of the Isabela Project
Charles Darwin Research Station
Galapagos National Park Service
Galapagos Islands, Ecuador

John Chapman
Dept. of Fisheries & Wildlife
Hatfield Marine Science Center
Oregon State University
Newport, OR 97365-5296
(541) 867-0235

Jeffery R. Cordell
Wetland Ecosystems Team
School of Fisheries
University of Washington
Seattle, WA 98195-7980
(206) 543-7532

Jeff Crooks
Ph.D. Student
Scripps Institution of Oceanography
La Jolla, CA 92093-0218
(619) 534-3579

Deborah M. Dexter
Professor of Biology
San Diego State University
San Diego, CA
(619) 594-6379

Claudio DiBacco
Univ. of California, San Diego
Scripps Institution of Oceanography
La Jolla, CA 92093-0218
(619) 534-3579

Tom Dudley
Lecturer and Research Associate
Dept. of Integrative Biology and
Environmental Sciences Program
University of California
Berkeley, CA 94720-3140

Jeffrey S. Dukes
NASA Earth System Science Fellow
Department of Biological Sciences
Stanford University
Stanford, CA 94305-5020
(415) 725-1858

Richard Emler
Associate Professor of Biology
Oregon Institute of Marine Biology
Charleston, OR 97420
(541)-888-2581

Michael S. Foster
Professor of Marine Science
Moss Landing Marine Laboratories
Moss Landing, CA 95039
(408) 755-8650

Terrence J. Frest
Senior Partner
Deixis Consultants
Seattle, WA 98115-7125
(206) 527-6764

Maggie Fusari, Director
University of California at
Santa Cruz Natural Reserves
Santa Cruz, CA 95064
(408) 459-4971

Jonathan B. Geller
Assistant Professor
Department of Biological Sciences
University of North Carolina
Wilmington, NC 28403
(910) 962-3357

Terrence M. Gosliner
Invertebrate Zoology and Geology
California Academy of Sciences
San Francisco, CA 94118-4599

Alan Gray
Head of Station
Institute of Terrestrial Ecology
Furzebrook Research Station
Wareham, UK BH20 5AS

Edwin Grosholz
Asst. Professor, Dept. of Zoology
and Center for Marine Biology
University of New Hampshire
Durham, NH 03824
(603) 862-4803

Gordon Hendler
Head, Invertebrate Zoology Section
Natural History Museum of
Los Angeles County
Los Angeles, CA 90007

Jan Hodder
Assistant Professor of Biology
Oregon Institute of Marine Biology
University of Oregon
Charleston, OR 97420
(541) (541) 888-2581 ext. 215

Ladd E. Johnson
Assistant Professor
Département de Biologie
Université Laval
Québec, QC G1K 7P4 Canada
(418) 656-2131 x2266

Michael Josselyn
Professor of Biology
Romberg Tiburon Center
San Francisco State University
Tiburon, CA 94920
(415) 435-7126

Andrew R. Juhl
Scripps Institution of Oceanography
La Jolla, CA 92093-0208
(619) 534-6579

John P. Kelly
Tomales Bay Research Center
Audubon Canyon Ranch
Marshall, CA 94940
(415) 663-8203

Harold W. Kerster
Emeritus Professor
Environmental Studies
California State University

Dale A. Kiefer
Professor of Biological Sciences
University of Southern California
Los Angeles, CA 90089-0371

Wim Kimmerer
Senior Research Scientist
Romberg Tiburon Center
San Francisco State University

Sacramento, CA 95819-6001

Kevin D. Lafferty
Research Biologist
Marine Science Institute
University of California
Santa Barbara, CA 93106
(805) 893-8778

William F. Laurance
Senior Research Scientist
National Institute for Research
in the Amazon
Manaus, AM 69011-970, Brazil

David M. Lodge
Associate Professor
Department of Biological Sciences
University of Notre Dame
Notre Dame, IN 46556
(219) 631-6094

Mary McGann
U. S. Geological Survey
Menlo Park, CA 94025
(650) 329-4979

William A. Newman
Prof. of Biological Oceanography
Curator of Benthic Invertebrates
Scripps Institution of Oceanography
La Jolla, CA 92093-0202

Annette M. Olson
Assistant Professor
School of Marine Affairs
University of Washington
Seattle, WA 98105-6715
(206) 685-2499

Wojciech Pelczarski
Sea Fisheries Institute
81-515 Gdynia, Poland
(058) 201748

Christopher Richard
Curator of Aquatic Biology
Oakland Museum of California
Oakland, CA 94607
(510) 238-3884

(213) 740-5814
(916) 363-7837

Charles C. Lambert
Professor of Zoology
California State University
Fullerton, CA 92834-6850
(714) 278-3481

Gang Li
University of California, Davis
Bodega Marine Laboratory
Bodega Bay, CA 94923-0247
(707) 875-1976

Linda McCann
Research Technician
Smithsonian Environmental
Research Center
Edgewater, MD 21037
(301) 261-4190

Claudia E. Mills
Friday Harbor Laboratories
University of Washington
Friday Harbor, WA 98250
(206) 543-1484

Thomas M. Niesen
Professor of Biology
San Francisco State University
San Francisco, CA 94132
(415) 338-6387

Ingrid M. Parker
Miller Postdoctoral Fellow
Department of Integrative Biology
University of California
Berkeley, CA 94720

William F. Perrin
Adjunct Professor, Marine Biology
Scripps Institution of Oceanography
University of California
La Jolla, CA 92037

Richard Rosenblatt
Professor of Marine Biology
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093-0208
(619) 534-2199

Tiburon, CA 94920
(415) 338-3515

Gretchen Lambert
Senior Research Associate
California State University
Fullerton, CA 92834-6850
(714) 278-3481

David R. Lindberg
Professor of Integrative Biology
University of California
Berkeley, CA 94720-4780
(510) 642-3926

Bruce S. Miller
Professor of Fisheries
School of Fisheries
University of Washington
Seattle, WA 98195
(206) 543-2135

Steve Murray
Professor of Biology
California State University
Fullerton, CA 92834-6850
(714) 278-7291

Elliott A. Norse
President, Marine Conservation
Biology Institute
Redmond, WA 98052-5208
(425) 883-8914

John Pearse
Institute of Marine Sciences
University of California
Santa Cruz, CA 95064
(408) 459-2455

John T. Rees
Bay Shore Research Station
Department of Biological Sciences
California State University
Hayward, CA 94542

Richard T. Roush
Assoc. Professor of Pest Management
University of Adelaide
Glen Osmond 5064, SA, Australia

Christine Schonewald
Associate Professor
Division of Environmental Studies
University of California
Davis, CA 95616
(916) 752-2088

Alan Shanks
Assistant Professor of Biology
Oregon Institute of Marine Biology
University of Oregon
Charleston, OR 97420
(541) 888-2581

Frank J. Shaughnessy
Assistant Professor of Botany
Humboldt State University
Arcata, CA 95521
(707) 826-4133

Paul Silva
Research Botanist
University of California, Berkeley
Berkeley, CA 94720-2465
(510) 643-7007

Doris Sloan
Adjunct Professor
Dept. of Geology and Geophysics
University of California, Berkeley
Berkeley, CA 94720
(510) 642-3703

L. David Smith
Assistant Professor
Marine Science Center
Northeastern University
Nahant, MA 01908
(617) 581-7370

Mark Sytsma
Associate Research Professor
Environmental Science and Resources
Portland State University
Portland, OR 97207-0751

Drew M. Talley
Graduate student
Scripps Institution of Oceanography
La Jolla, CA 92093-0218
(619) 534-3579

Theresa Sinicrope Talley
Research Associate
Scripps Institution of Oceanography
La Jolla, CA 92093-0218

Trevor Taylor
Field Technician
Bureau of Land Management
Eugene, OR 97401

Robert J. Van Syoc
Senior Collection Manager
Invertebrate Zoology and Geology
California Academy of Sciences
San Francisco, CA 94118-4599
(415) 750-7082

Inger Wallentinus
Professor in Marine Botany
Goteborg University
Goteborg, Sweden
+46-31 773 27 02

William C. Walton
Ph.D. student, Fisheries Science
University of Maryland
Smithsonian Environmental
Research Center
Edgewater, MD 21037

Kerstin Wasson
U. C. Presidents Postdoctoral Fellow
Department of Biology
University of California
Santa Cruz, CA 95064
(408) 459-4026

James M. Watanabe
Lecturer
Hopkins Marine Station
Stanford University
Pacific Grove, CA 93950

Marjorie Wonham
Department of Zoology
University of Washington
Seattle, WA 98195-1800

Peter Yodzis
Professor of Zoology
University of Guelph
Guelph, Ontario N1G 2W1 Canada

Richard C. Zimmerman
Associate Research Scientist
Moss Landing Marine Laboratories
Moss Landing, CA 95039