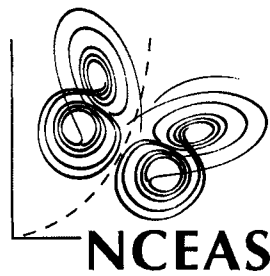


17 Feb 2001; Annual Meeting  
of the American Association  
For the Advancement of the  
Sciences

For information, contact: Patty  
Debenham (805) 892-2518 or  
George Leonard (831) 647-  
6830



National Center for Ecological  
Analysis and Synthesis  
University of California  
735 State Street, Suite 300  
Santa Barbara, CA 93101-5504  
<http://www.nceas.ucsb.edu/>

## SCIENTIFIC CONSENSUS STATEMENT ON MARINE RESERVES AND MARINE PROTECTED AREAS

### THE CONTEXT

At the 1997 Annual Meeting of the American Association for the Advancement of Science (AAAS), a symposium on marine protected areas reviewed the state of the oceans, raised a number of unresolved critical scientific issues and identified research priorities. In response, an international team of scientists was convened at the National Center for Ecological Analysis and Synthesis (NCEAS) and charged with developing better scientific understanding of marine protected areas and marine reserves. Conclusions from the two-and-a-half-year efforts of this working group are *in press* in a special issue of the journal *Ecological Applications*. This Scientific Consensus Statement is based upon those results and other research already published elsewhere. The Statement is a joint effort of the NCEAS scientists and the academic scientists participating in a meeting on marine reserves convened by COMPASS (Communication Partnership for Science and the Sea). This Statement was drafted in response to repeated requests by many fishermen, marine resource managers, governmental officials, conservation activists, interested citizens and others for a succinct, non-technical but scientifically accurate summary of the current scientific knowledge about marine reserves. Additional information on the history of this Statement, NCEAS and COMPASS appears after the Statement.

### **New Approaches Are Needed:**

The declining state of the oceans and the collapse of many fisheries have created a critical need for new and more effective management of marine biodiversity, populations of exploited species and overall health of the oceans. Marine reserves are a highly effective but under-appreciated and under-utilized tool that can help alleviate many of these problems. At present, less than 1% of United States territorial waters and less than 1% of the world's oceans are protected in reserves.

## What are Marine Reserves?

**Marine Reserves (MRVs)** are areas of the sea completely protected from all extractive activities. Within a reserve, all biological resources are protected through prohibitions on fishing and the removal or disturbance of any living or non-living marine resource, except as necessary for monitoring or research to evaluate reserve effectiveness. Marine reserves are sometimes called “ecological reserves,” “fully-protected marine reserves,” or “no-take areas.” **MRVs** are a special category of **Marine Protected Areas (MPAs)**. MPAs are areas designated to enhance conservation of marine resources. The actual level of protection within MPAs varies considerably; most allow some extractive activities such as fishing, while prohibiting others such as drilling for oil or gas. **A Network of Marine Reserves** is a set of **MRVs** within a biogeographic region, connected by larval dispersal and juvenile or adult migration.

## THE SCIENTIFIC CONSENSUS

The first formal marine reserves were established more than two decades ago. Recent analyses of the changes occurring within these MRVs allow us to make the following conclusions:

### **Ecological effects *within* reserve boundaries:**

- 1) Reserves result in long-lasting and often rapid increases in the abundance, diversity and productivity of marine organisms.
- 2) These changes are due to decreased mortality, decreased habitat destruction and to indirect ecosystem effects.
- 3) Reserves reduce the probability of extinction for marine species resident within them.
- 4) Increased reserve size results in increased benefits, but even small reserves have positive effects.
- 5) Full protection (which usually requires adequate enforcement and public involvement) is critical to achieve this full range of benefits. Marine protected areas do not provide the same benefits as marine reserves.

### **Ecological effects *outside* reserve boundaries:**

- 1) In the few studies that have examined spillover effects, the size and abundance of exploited species increase in areas adjacent to reserves.

- 2) There is increasing evidence that reserves replenish populations regionally via larval export.

**Ecological effects of reserve *networks*:**

- 1) There is increasing evidence that a network of reserves buffers against the vagaries of environmental variability and provides significantly greater protection for marine communities than a single reserve.
- 2) An effective network needs to span large geographic distances and encompass a substantial area to protect against catastrophes and provide a stable platform for the long-term persistence of marine communities.

**ANALYSES OF THE BEST AVAILABLE EVIDENCE  
LEAD US TO CONCLUDE THAT:**

- ◆ Reserves conserve both fisheries and biodiversity.
- ◆ To meet goals for fisheries and biodiversity conservation, reserves must encompass the diversity of marine habitats.
- ◆ Reserves are the best way to protect resident species and provide heritage protection to important habitats.
- ◆ Reserves must be established and operated in the context of other management tools.
- ◆ Reserves need a dedicated program to monitor and evaluate their impacts both within and outside their boundaries.
- ◆ Reserves provide a critical benchmark for the evaluation of threats to ocean communities.
- ◆ Networks of reserves will be necessary for long-term fishery and conservation benefits.
- ◆ Existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool.

This Scientific Consensus Statement is signed by 161 leading marine scientists and experts on marine reserves. Signatories all hold Ph.D. degrees and are employed by academic institutions. Names and affiliations of signatories appear on pages 5 - 12.

## History and Purpose of this Statement

This Statement was drafted in response to repeated requests by many fishermen, marine resource managers, governmental officials, conservation activists, interested citizens and others for a succinct, non-technical but scientifically accurate summary of the current scientific knowledge about marine reserves.

The Statement is based on work conducted primarily by the NCEAS Working Group on Marine Reserves, co-chaired by Jane Lubchenco, Stephen R. Palumbi and Steven D. Gaines. The National Center for Ecological Analysis and Synthesis (NCEAS - <http://www.nceas.ucsb.edu/>) is a scientific institution funded by the National Science Foundation, the State of California and the University of California, Santa Barbara. The mission of NCEAS is to advance the state of ecological knowledge through the search for general patterns and principles and to organize and synthesize ecological information in a manner useful to researchers, resource managers, and policy makers addressing important environmental issues. The Working Group on Marine Reserves (WGMR) was convened in May 1998 following a Symposium on The Science of Marine Protected Areas at the Annual Meeting of the American Association for the Advancement of Science (AAAS) in February 1997. Products from the Working Group have been published or are *in press* in peer-reviewed scientific journals.

The initial version of this Scientific Consensus Statement was drafted in August 2000 at a meeting on “The Science and Development of Marine Protected Areas and Fully Protected Marine Reserves along the U.S. West Coast” held in Monterey, California. The meeting was organized and sponsored by COMPASS (<http://www.CompassOnline.org/>), the Communication Partnership for Science and the Sea, a collaboration among Island Press, SeaWeb, Monterey Bay Aquarium and an independent Board of Scientific Experts. The mission of COMPASS is to advance and communicate marine conservation science. Dr. Megan Dethier and Dr. Stephen R. Palumbi coordinated the academic scientist group which drafted the initial Statement at the Monterey COMPASS meeting, following presentations by NCEAS Working Group scientists.

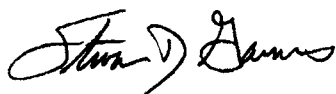
The intended audience for the Statement includes resource users, policymakers, non-governmental organizations, and interested citizens. Signatories are academic Ph.D. scientists with expertise relevant to reserves.

For further information about NCEAS, COMPASS, the Statement, a list of scientific products from the NCEAS Working Group on Marine Reserves or to add your name for future use of the Statement, please contact Dr. Patty Debenham [pdebenham@nceas.ucsb.edu](mailto:pdebenham@nceas.ucsb.edu) or Dr. George Leonard [gleonard@mbayaq.org](mailto:gleonard@mbayaq.org).

**An electronic version of this Statement is available at  
<http://www.CompassOnline.org/> or  
<http://www.nceas.ucsb.edu/Consensus>**

## Initial Signatories

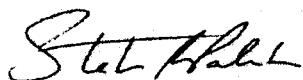
### (Members of the NCEAS Working Group on Marine Reserves and Participants in the Academic Scientist Group at the COMPASS Monterey Meeting on Marine Reserves)



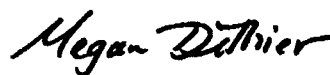
Steven D. Gaines  
Co-Chair NCEAS WGMR  
University of California,  
Santa Barbara



Jane Lubchenco  
Co-Chair NCEAS WGMR  
Oregon State University



Stephen R. Palumbi  
Co-Chair NCEAS WGMR  
Harvard University



Megan N. Dethier  
Academic Coordinator, COMPASS  
Meeting  
University of Washington

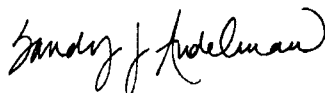
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Gary Allison  
Oregon State University



George M. Branch  
University of Cape Town



Sandy J. Andelman  
National Center for Ecological Analysis  
and Synthesis



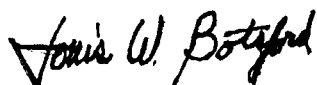
Mark H. Carr  
University of California,  
Santa Cruz



P. Dee Boersma  
University of Washington



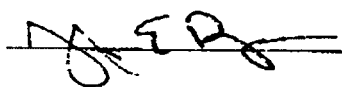
Juan Carlos Castilla  
Pontificia Universidad Catolica de Chile



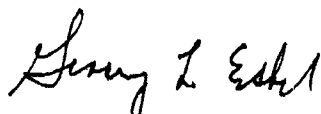
Louis W. Botsford  
University of California,  
Davis



Paul K. Dayton  
Scripps Institution of Oceanography



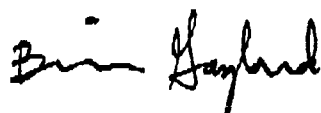
Jenifer E. Dugan  
University of California,  
Santa Barbara



Ginny L. Eckert  
University of Alaska  
Southeast



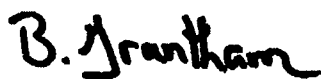
David Fluharty  
University of Washington



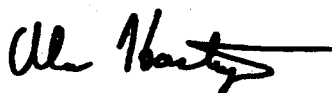
Brian Gaylord  
University of California,  
Santa Barbara



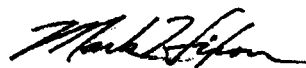
Leah Gerber  
University of California,  
Santa Barbara



Brian A. Grantham  
Oregon State University



Alan Hastings  
University of California,  
Davis



Mark A. Hixon  
Oregon State University



Fiorenza Micheli  
Stanford University



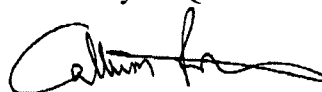
Joseph Edward Neigel  
University of Louisiana at Lafayette



Daniel Pauly  
University of British Columbia



Hugh Philip Possingham  
University of Queensland



Callum M. Roberts  
University of York



Andrew A. Rosenberg  
University of New Hampshire



Jennifer Ruesink  
University of Washington



Alan Shanks  
University of Oregon



Robert R. Warner  
University of California,  
Santa Barbara



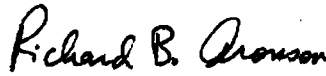
Richard R. Strathmann  
University of Washington

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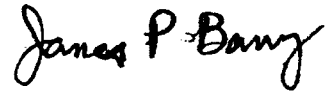
### Additional Signatories



Angel C. Alcala  
Silliman University



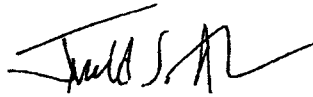
Richard B. Aronson  
University of South  
Alabama



James P. Barry  
Monterey Bay Aquarium  
Research Institute



Saul Alvarez-Borrego  
Centro de Investigacion  
Cientifica y de Educacion  
Superior de Ensenada



Jerald S. Ault  
University of Miami



James P. Beets  
Jacksonville University



Richard F. Ambrose  
University of California,  
Los Angeles



John C. Avise  
University of Georgia



Eric L. Berlow  
University of California,  
Berkeley



Steven S. Amesbury  
University of Guam



Russell C. Babcock  
University of Auckland



Mark D. Bertness  
Brown University



Richard S. Appeldoorn  
University of Puerto Rico



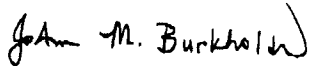
William J. Ballantine  
University of Auckland




Charles Birkeland  
University of Hawaii at  
Manoa



Carol Blanchette  
University of California,  
Santa Barbara



JoAnn M. Burkholder  
North Carolina State  
University




Leo Richard Bodensteiner  
Western Washington  
University



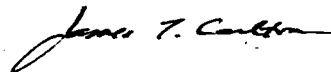
Ronald S. Burton  
Scripps Institution of  
Oceanography




Rodrigo H. Bustamante  
Charles Darwin Research  
Station, Galapagos



James E. Byers  
University of Washington



James T. Carlton  
Williams College



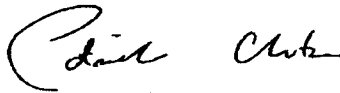
Emily Carrington  
University of Rhode Island



Jacque Carter  
University of New  
England



Jennifer Caselle  
University of California,  
Santa Barbara



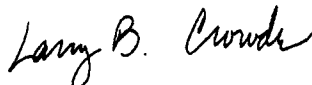
Patrick Christie  
University of Washington



Felicia Coleman  
Florida State University



David O. Conover  
State University of New  
York at Stony Brook



Larry B. Crowder  
Duke University



Benjamin E. Cuker  
Hampton University




Elizabeth P. Dahlhoff  
Santa Clara University



Edward Dever  
University of California,  
San Diego



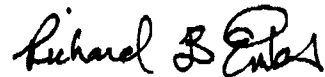
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Western Washington University



David Duggins  
University of Washington



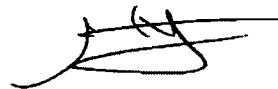
Phillip Dustan  
College of Charleston



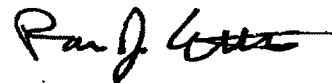
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University of Oregon



Roberto R. Enriquez  
Universidad Autonoma de Baja  
California



Marta Estrada  
Institut de Ciencies del Mar

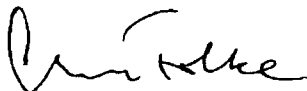


Ron Etter  
University of Massachusetts

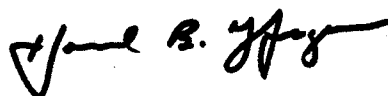




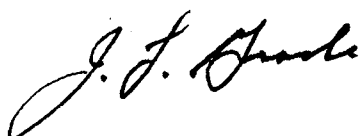
Miriam Fernandez  
Pontificia Universidad  
Catolica de Chile



Carl Folke  
Stockholm University



Howard B. Glasgow Jr.  
North Carolina State  
University



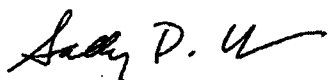
J. Frederick Grassle  
Rutgers University



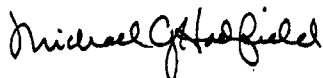
Judith P. Grassle  
Rutgers University



Richard Grosberg  
University of California,  
Davis




Sally D. Hacker  
Washington State  
University, Vancouver



Michael G. Hadfield  
University of Hawaii at  
Manoa



C. Drew Harvell  
Cornell University



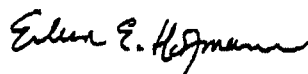
Mark E. Hay  
Georgia Institute of  
Technology



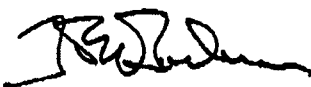
Brian Helmuth  
University of South  
Carolina



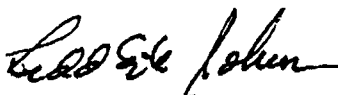
Helen Hess  
College of the Atlantic



Eileen E. Hofmann  
Old Dominion University



Jeremy B. C. Jackson  
Scripps Institution of  
Oceanography



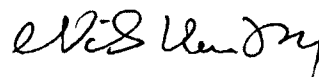
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Laval University



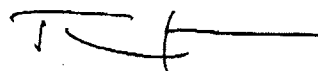
Ron Karlson  
University of Delaware



Les Kaufman  
Boston University



Nils Kautsky  
Stockholm University



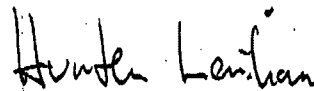
Terrie Klinger  
University of Washington



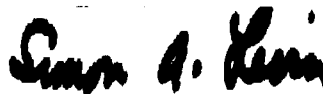
Nancy Knowlton  
Scripps Institution of  
Oceanography



Christopher C. Koenig  
Florida State University



Hunter Lenihan  
University of North Carolina  
at Chapel Hill



Simon A. Levin  
Princeton University



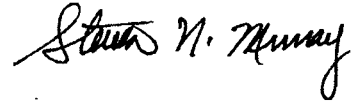
Jeffrey Levinton  
State University of New York at  
Stony Brook



Don R. Levitan  
Florida State University



Laurence David Mee  
University of Plymouth



Steven N. Murray  
California State University,  
Fullerton



Romuald N. Lipcius  
Virginia Institute of Marine  
Science



Bruce Menge  
Oregon State University



Sergio Navarrete  
Pontificia Universidad Catolica  
de Chile



Michael A. Mallin  
University of North  
Carolina at Wilmington



Kathy Ann Miller  
University of Southern  
California



Rosamond Naylor  
Stanford University



Marc Mangel  
University of California,  
Santa Cruz



Todd E. Minchinton  
University of California,  
Santa Cruz



John C. Ogden  
Florida Institute of  
Oceanography



Helene Marsh  
James Cook University



Steven G. Morgan  
University of California,  
Davis



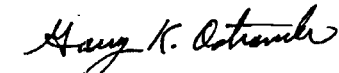
Richard W. Osman  
Academy of Natural Sciences



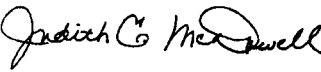
Jerry McCormick-Ray  
University of Virginia



James G. Morin  
Cornell University



Gary K. Ostrander  
John Hopkins University



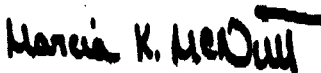
Judith E. McDowell  
Woods Hole  
Oceanographic Institution



Daniel E. Morse  
University of California,  
Santa Barbara



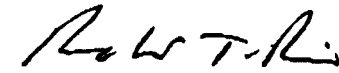
Dianna K. Padilla  
State University of New York at  
Stony Brook




Marcia K. McNutt  
Monterey Bay Aquarium  
Research Institute



Lauren Mullineaux  
Woods Hole  
Oceanographic Institution



Robert T. Paine  
University of Washington



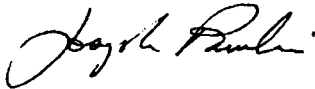
Gustav Paulay  
University of Florida



Nancy N. Rabalais  
Louisiana Universities  
Marine Consortium



Garry Ronald Russ  
James Cook University



Joseph R. Pawlik  
University of North  
Carolina at Wilmington



Peter Raimondi  
University of California,  
Santa Cruz



Yvonne Sadovy  
University of Hong Kong



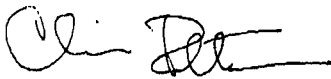
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University of North  
Carolina



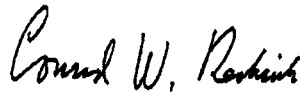
G. Carleton Ray  
University of Virginia



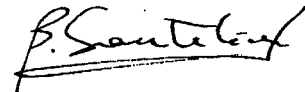
Eric Sanford  
Stanford University



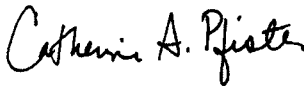
Christopher W. Petersen  
College of the Atlantic



Conrad W. Recksier  
University of Rhode Island



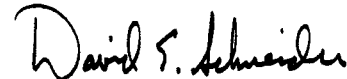
Bernabe Santelices  
Pontificia Universidad Catolica  
de Chile



Catherine Ann Pfister  
University of Chicago



Daniel C. Reed  
University of California,  
Santa Barbara



David E. Schneider  
Western Washington University



Stuart Pimm  
Columbia University



Michael A. Rex  
University of  
Massachusetts  
Boston



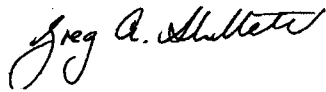
Daniel Simberloff  
University of Tennessee



Tony J. Pitcher  
University of British  
Columbia



Robert H. Richmond  
University of Guam



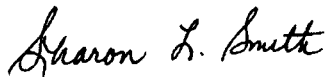
Greg A. Skilleter  
University of Queensland



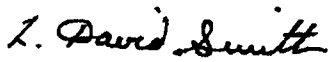
Gerry Quinn  
Monash University



Sandra L. Romano  
University of the Virgin  
Islands



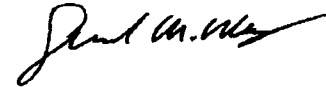
Sharon L. Smith  
University of Miami



Leslie David Smith  
Northeastern University



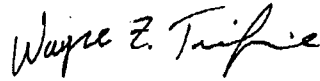
Joseph Travis  
Florida State University



Gerald M. Wellington  
University of Houston



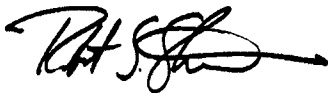
George N. Somero  
Stanford University



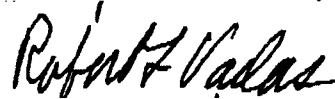
Wayne Z. Trivelpiece  
Montana State University



Michael C. Whitlock  
University of British Columbia



Robert S. Steneck  
University of Maine



Robert L. Vadas, Sr.  
University of Maine



Susan L. Williams  
University of California,  
Davis



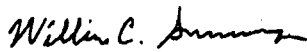
Suzanne Strom  
Western Washington  
University



Kathryn L. Van Alstyne  
Western Washington  
University



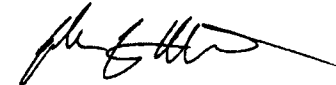
A. O. Dennis Willows  
University of Washington



William C. Summers  
Western Washington  
University



Cindy Lee Van Dover  
The College of William  
and Mary



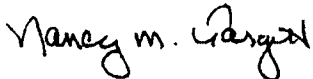
J. Timothy Wootton  
University of Chicago



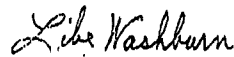
Craig Syms  
University of California,  
Santa Cruz



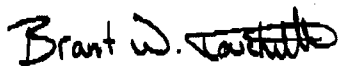
Amanda Vincent  
McGill University



Nancy M. Targett  
University of Delaware



Libe Washburn  
University of California,  
Santa Barbara



Brant W. Touchette  
North Carolina State  
University



Les Watling  
University of Maine