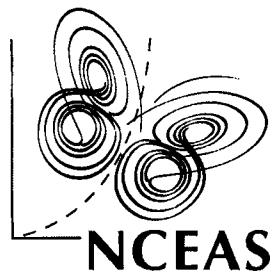


17 Feb 2001; Annual Meeting  
of the American Association  
For the Advancement of the  
Sciences

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## 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.

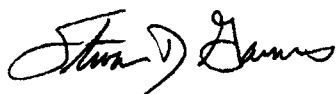
The intended audience for the Statement includes resource users, policymakers, non-governmental organizations, and interested citizens. Signatories are academic Ph.D. scientists with expertise relevant to reserves.

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).

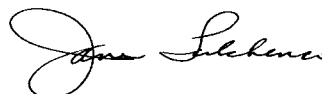
**An electronic version of this Statement is available at  
<http://www.CompassOnline.org/> or  
<http://www.nceas.ucsb.edu/Consensus>**

## Initial Signatories

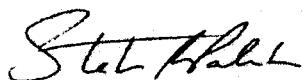
### (Members of the NCEAS Working Group on Marine Reserves and Participants in the Academic Scientist Group at the COMPASS Monterey Meeting on Marine Reserves)



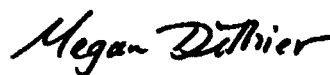
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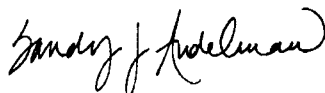
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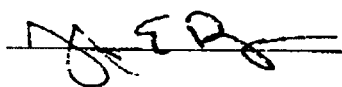
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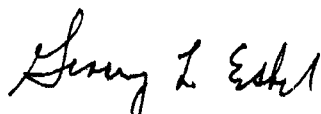
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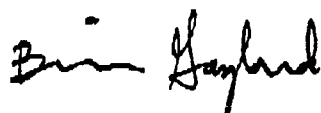
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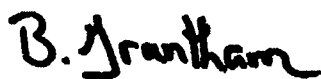
David Fluharty  
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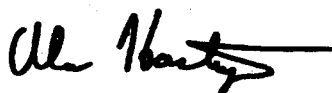
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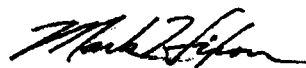
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Alan Hastings  
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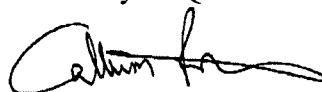
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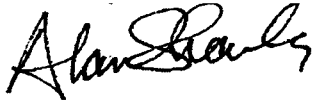
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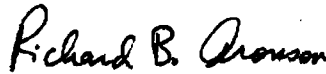
Richard R. Strathmann  
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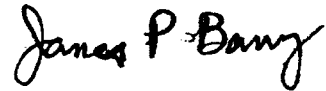
### Additional Signatories



Angel C. Alcala  
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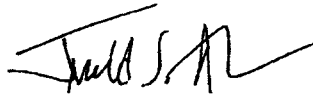
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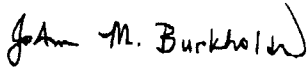
William J. Ballantine  
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JoAnn M. Burkholder  
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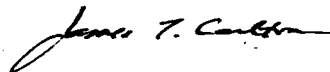
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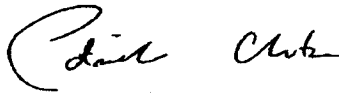
Emily Carrington  
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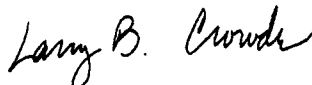
Patrick Christie  
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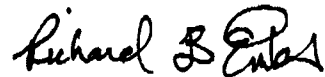
Paul A. Dinnel  
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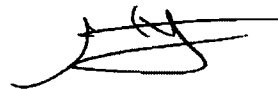
Phillip Dustan  
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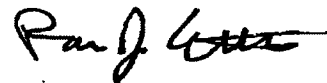
Richard Bono Emlet  
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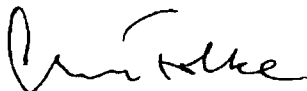


Ron Etter  
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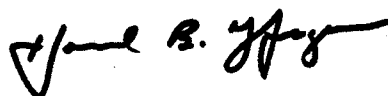




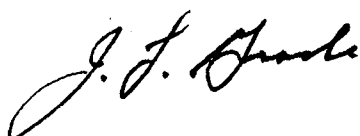
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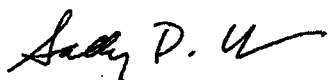
J. Frederick Grassle  
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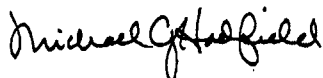
Judith P. Grassle  
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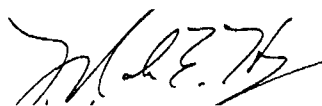
Sally D. Hacker  
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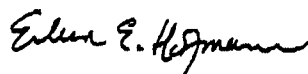
Mark E. Hay  
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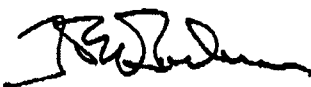
Brian Helmuth  
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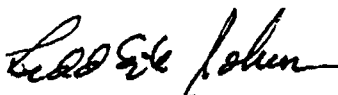
Helen Hess  
College of the Atlantic



Eileen E. Hofmann  
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Jeremy B. C. Jackson  
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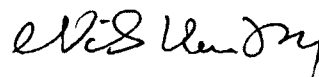
Ladd Erik Johnson  
Laval University



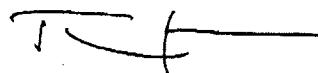
Ron Karlson  
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Les Kaufman  
Boston University



Nils Kautsky  
Stockholm University



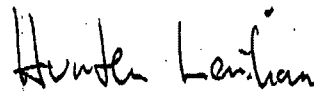
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University of Washington



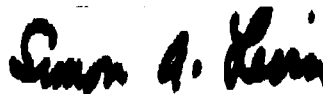
Nancy Knowlton  
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Florida State University



Hunter Lenihan  
University of North Carolina  
at Chapel Hill



Simon A. Levin  
Princeton University



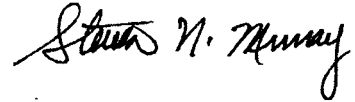
Jeffrey Levinton  
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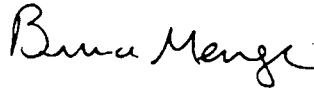
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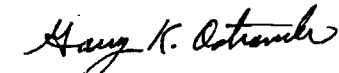
Richard W. Osman  
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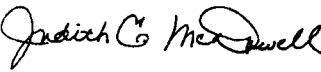
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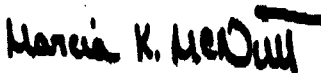
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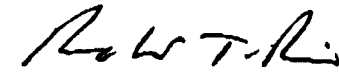
Dianna K. Padilla  
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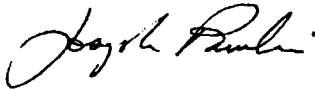
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University of Hong Kong



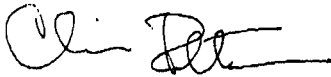
Charles Henry Peterson  
University of North  
Carolina



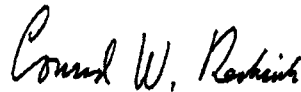
G. Carleton Ray  
University of Virginia



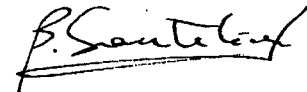
Eric Sanford  
Stanford University



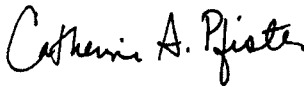
Christopher W. Petersen  
College of the Atlantic



Conrad W. Recksier  
University of Rhode Island



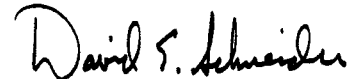
Bernabe Santelices  
Pontificia Universidad Catolica  
de Chile



Catherine Ann Pfister  
University of Chicago



Daniel C. Reed  
University of California,  
Santa Barbara



David E. Schneider  
Western Washington University



Stuart Pimm  
Columbia University



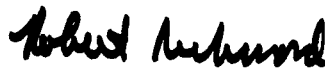
Michael A. Rex  
University of  
Massachusetts  
Boston



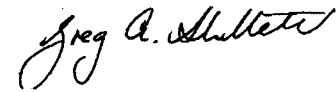
Daniel Simberloff  
University of Tennessee



Tony J. Pitcher  
University of British  
Columbia



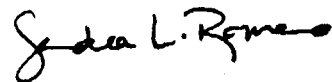
Robert H. Richmond  
University of Guam



Greg A. Skilleter  
University of Queensland



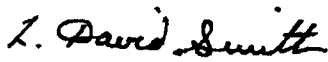
Gerry Quinn  
Monash University



Sandra L. Romano  
University of the Virgin  
Islands



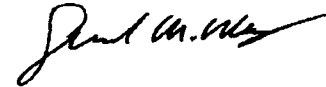
Sharon L. Smith  
University of Miami



Leslie David Smith  
Northeastern University



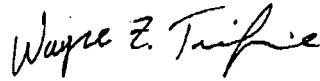
Joseph Travis  
Florida State University



Gerald M. Wellington  
University of Houston



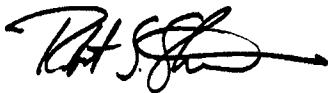
George N. Somero  
Stanford University



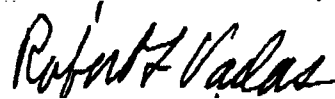
Wayne Z. Trivelpiece  
Montana State University



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



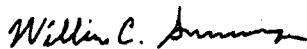
Suzanne Strom  
Western Washington  
University



Kathryn L. Van Alstyne  
Western Washington  
University



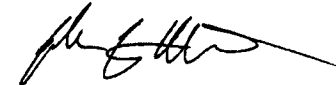
A. O. Dennis Willows  
University of Washington



William C. Summers  
Western Washington  
University



Cindy Lee Van Dover  
The College of William  
and Mary



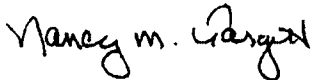
J. Timothy Wootton  
University of Chicago



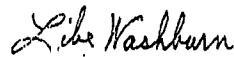
Craig Syms  
University of California,  
Santa Cruz



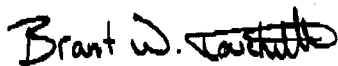
Amanda Vincent  
McGill University



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