

# David M. Kaplan

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## EDUCATION

**Doctor of Philosophy (PhD)**, Department of Physics, University of California at Santa Barbara, 1997. Dissertation: Some new developments in the study of black holes and solitons in string theory. Adviser: Prof. A. Strominger.

**M.A.**, Department of Physics, University of California at Santa Barbara, 1996. Adviser: Prof. A. Strominger.

**Honors B.Sc. (Magna Cum Laude)** in Math/Physics, Brown University, Providence, RI, 1993. Sr. thesis adviser: Prof. R. Brandenberger.

**High School**, Northern Highlands Regional, Allendale, NJ, 1989 (with honors).

## AREAS OF SPECIALIZATION

Population dynamics of marine species; design of marine reserves; plankton transport; larval dispersal; coastal oceanography; modeling; computational ecology; primary productivity

## RESEARCH EXPERIENCE

### **Assistant Researcher, UC Santa Cruz, 4/2006-Present:**

Ongoing research as part of the Coastal Ocean Currents Monitoring Program (COCMP; <http://www.cocmp.org/>). The goal of this multi-university project is to create a network of HF radars along the coast of California that map currents out to the continental shelf. I am involved in the analysis of this extensive dataset and the application of this data to problems related to particle transport, primary productivity, larval dispersal and water quality. I also continue to work on population models for assessing persistence and yield in marine reserve networks and am actively involved in the state MLPA initiative to establish a network of marine reserves.

### **Postdoctoral Researcher, UC Davis, 5/2001-3/2006:**

Research in marine ecology, focusing on population dynamics and physical transport processes in coastal waters. I used size- and/or age-structured, spatially explicit metapopulation models to study the factors and processes that determine the success or failure of a system of coastal marine reserves. I also worked on understanding the physical and biological forces that determine settlement success for larval fish and invertebrates in upwelling systems. High-frequency (HF) radar data, a system for measuring ocean surface currents over large areas, was an integral part of this research. We used HF-radar data to accurately describe the physical forces driving coastal

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circulation over the continental shelf along a section of the northern California coast.

### **Postdoctoral Researcher, P. Univ. Católica de Chile, 5/1998-5/2001:**

Studied coastal transport processes of phytoplankton and zooplankton in the upwelling system of central Chile. We looked at the diurnal sea-breeze as a possible nearshore transport process for invertebrate larvae. We also examined multi-year time series of nearshore phytoplankton and related phytoplankton blooms to upwelling/relaxation dynamics. Finally, we studied the effect of omnivory in systems of mixed open and closed populations with three trophic levels.

### **Graduate Student, UC Santa Barbara, 9/1993-12/1997:**

Dissertation work in string theory, focusing on black holes and thermodynamics. We compared thermodynamic properties of black holes in string theory and General Relativity and found exact agreement, suggesting that string theory is a good theory of gravity.

## TEACHING EXPERIENCE

### **Matlab mini-course, UC Davis, 9/2001 & 9/2005:**

Gave a series of lectures on basic programming in Matlab for ecologists. Class notes available at <http://erizo.ucdavis.edu/~dmk/matlab-mini-course/>.

### **Teaching Assistant, UC Santa Barbara, 9/1993-12/1997:**

Ran laboratory, discussion and student help sessions for a variety of physics classes, including Introductory Physics for Biologists, Introductory Physics for Engineers, Thermodynamics, Quantum Mechanics and String Theory.

### **Teaching Assistant, Brown University, 8/1991-5/1993:**

Developed and ran innovative computer laboratory sessions for several undergraduate mathematics classes under the direction of Professor Thomas Banchoff (<http://www.math.brown.edu/~banchoff/>). These laboratories were revolutionary for their time, involving distributed and internet-based learning techniques that are now commonplace.

## RECENT FUNDING SOURCES

Community genetics and marine protected areas of the California and Baja California mainland and island array, CEQI, 2007-present, **PI**

HF Radar National Network Data Management Development, NOAA, 2007-present, **PI**

Packard Ocean Science and Technology Grant, Packard Foundation, 2006-present, **PI**  
California Ocean Decision System for the Marine Life Protection Act, Resource Legacy Funding Foundation, 2006-present, **PI**

Coastal Ocean Currents Monitoring Program (COCMP), Coastal Conservancy, 2006-present

Wind Events and Shelf Transport (WEST), NSF Coastal Ocean Processes Program (CoOP), 2001-2006

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Physical Influences on California Current Salmon, NSF Global Ocean Ecosystem Dynamics (GLOBEC), 2001-2003

Spatial Management of Fisheries, California Sea Grant, 2001-2003

### PUBLICATIONS

#### In preparation (3):

Kaplan DM, Botsford LW, O'Farrell MR (*in prep.*) Does Maximum Sustainable Yield (MSY) increase with marine reserves?

Kaplan DM, Halle CM, Paduan J, Largier JL (*in prep.*) Surface circulation patterns along the northern and central coast of California from a large HF Radar array.

Moffitt E, Botsford LW, Kaplan DM, O'Farrell MR (*in prep.*) The effect of adult movement on persistence in networks of marine reserves.

#### Submitted (1):

Kaplan DM, Botsford LW, Gaines S (*submitted*) Model-based assessment of persistence in proposed marine protected area designs for the central California coast. *Ecological Applications*.

#### Journal Publications (14):

Kaplan DM, Lekien F (*accepted*) Spatial interpolation and filtering of surface current data based on open-boundary modal analysis. *Journal of Geophysical Research*.

Kaplan DM, Botsford LW, Jorgensen S (2006) Dispersal-per-recruit: an efficient method for assessing sustainability in marine reserve networks. *Ecological Applications* **16**: 2248-2263.

Jorgensen SJ, Kaplan DM, Klimley AP, Morgan SG, O'Farrell MR, Botsford, LW (2006) Limited movement in blue rockfish *Sebastes mystinus*: internal structure of home range. *Marine Ecology Progress Series* **327**: 157-170.

Largier JL, Lawrence C, Roughan M, Kaplan DM, Dever E, Dorman C, Kudela R, Bollens S, Wilkerson F, Dugdale R, Botsford LW, Garfield NT, Kuebel-Cervantes B, Koracin D (2006) WEST: a northern California study of the role of wind-driven transport in the productivity of coastal plankton communities. *Deep-Sea Research II* **53**: 2833-2849, [doi:10.1016/j.dsr2.2006.08.018](https://doi.org/10.1016/j.dsr2.2006.08.018).

Kaplan DM, Largier JL (2006) HF radar-derived origin and destination of surface waters off Bodega Bay, California. *Deep-Sea Research II* **53**: 2906-2930, [doi:10.1016/j.dsr2.2006.07.012](https://doi.org/10.1016/j.dsr2.2006.07.012).

Kaplan DM (2006) Alongshore advection and marine reserves: consequences for modeling and management. *Marine Ecology Progress Series* **309**: 11-24.

Kaplan DM, Largier JL, Botsford LW (2005) HF radar observations of surface circulation off Bodega Bay (northern California, USA). *Journal of Geophysical Research* **110**: C10020, [doi:10.1029/2005JC002959](https://doi.org/10.1029/2005JC002959).

Velazquez I, Kaplan DM, Velasco-Hernandez JX, Navarrete SA (2005) Multistability in an open recruitment food web model. *Applied Mathematics and Computation* **163**: 275-294.

Kaplan DM, Botsford LW (2005) Effects of variability in spacing of marine reserve on fisheries yield and sustainability. *Canadian Journal of Fisheries and Aquatic*

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*Sciences* **62**: 905-912.

Kaplan DM, Largier JL, Navarrete SA, Guíñez R, Castilla JC (2003) Large diurnal temperature fluctuations in the nearshore water column. *Estuarine, Coastal and Shelf Science* **57**: 385-398.

Wieters E, Kaplan DM, Navarrete SA, Sotomayor A, Largier JL, Nielsen K, Veliz F (2003) Alongshore and temporal variability in chlorophyll-a concentration in Chilean nearshore waters. *Marine Ecology Progress Series* **249**: 93-105.

Kaplan DM, Lowe DA, Maldacena JM, Strominger A (1997) Microscopic entropy of  $N=2$  extremal black holes. *Physical Review D* **55**: 4898-902.

Kaplan DM, Michelson J (1997) Scattering of several multiply charged extremal  $D=5$  black holes. *Physics Letters B* **410**: 125-30.

Kaplan DM, Michelson J (1996) Zero modes for the  $D=11$  membrane and five-brane. *Physical Review D* **53**: 3474-6.

### Edited Volume Publications (1):

Botsford LW, Kaplan DM, Hastings A (2004) Sustainability and Yield in Marine Reserve Policy. *In Aquatic Protected Areas as Fisheries Management Tools. Edited by J.B. Shipley. American Fisheries Society, Bethesda, Maryland. pp. 75-86.*

### Non-ISI Publications (3):

Kaplan DM, Botsford LW, O'Farrell MR (2007) Assessment of proposed marine protected area designs on the central California coast. *Report for the Marine Life Protection Act (MLPA) implementation process.*

Paduan J, Kaplan DM, Garfield N, Largier JL (2006) Surface current mapping with high frequency radar - Building the tools for hazardous spill response. *Monterey Bay National Marine Sanctuary (MBNMS) Ecosystem Observations.*

Brandenberger R, Kaplan DM, Ramsey S (1993) Some Statistics for Measuring Large Scale Structure. BROWN-HET-922, astro-ph/9310004.

## POSTERS AND PRESENTATIONS

### Conference Presentations (19):

Kaplan DM, Paduan J, Cook M (2007) Status of the Northern California HF Radar network and some new developments in HF Radar processing technology. *Radio Oceanography Workshop 7. Cancún, Mexico. May 28-31.*

Kaplan DM, Paduan J, Cook M, Lekien F (2006) Integrating HF radar, modal current decomposition and trajectory forecasting for robust ocean observing. *53<sup>rd</sup> Annual Eastern Pacific Ocean Conference. Timberline Lodge, Oregon. September 27-30.*

Kaplan DM, Botsford LW, Jorgensen S (2006) Methods for assessment of sustainability in spatial management: evaluating marine reserve configurations. *91<sup>st</sup> Ecological Society of America Annual Meeting. Memphis, TN. August 6-11.*

Kaplan DM (2006) Circulation and transport near Bodega Bay, California derived from modal decomposition of HF-radar currents. *Radio Oceanography Workshop 6. Hamburg, Germany. May 15-18.*

Kaplan DM, Botsford LW (2006) Methods for assessments of sustainability in spatial management: Evaluating reserve designs. *NOAA National Stock Assessment*

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- Workshop 9*. San Francisco, California. April 18-20.
- Kaplan DM, Largier JL, Lekien F (2006) Application of Modal Current Decomposition techniques to the study of coastal circulation and transport near Bodega Bay, California. *Ocean Sciences Meeting*. Honolulu, Hawaii. February 20-24. **Poster**.
- Kaplan DM, Largier JL, Botsford LW (2005) The role of HF radar data in the WEST project. *52<sup>nd</sup> Annual Eastern Pacific Ocean Conference*. Fallen Leaf Lake, California. September 27-30.
- Kaplan DM (2005) The California MPA process from a scientist's point of view: pitfalls and progress. *British Ecological Society Annual Meeting*. Hertfordshire, England. September 5-7.
- Kaplan DM, Largier JL, Botsford LW (2005) Coastal connectivity and its relationship to biological processes from HF-radar derived Lagrangian trajectories. *Radio Oceanography Workshop 5*. Santa Cruz, California. May 3-6.
- Kaplan DM (2004) Spacing and configuration of marine reserve networks. *ICES Annual Science Conference*. Vigo, Spain. September 22-25.
- Kaplan DM, Botsford LW, Micheli F, Halpern B, Warner RR (2004) Temporal dynamics of fish populations after introduction of marine reserves. *89<sup>th</sup> Ecological Society of America Annual Meeting*. Portland, OR. August 1-6. **Poster**.
- Kaplan DM, Largier JL, Botsford LW (2004) Surface currents along the coast of northern California derived from high-frequency radar data. *12<sup>th</sup> Ocean Sciences Meeting*. Portland, OR. January 26-30.
- Kaplan DM, Largier JL, Botsford LW (2002) Preliminary analysis of high-frequency radar data from Bodega Bay, California. *11<sup>th</sup> Ocean Sciences Meeting*. Honolulu, Hawaii. February 11-15.
- Sotomayor A, Wieters E, Kaplan DM, Navarrete S, Nielsen K (2000) Spatial and Temporal Variation in Chlorophyll-a on the Central Coast of Chile. *PISCO/Mellon Symposium*. Portland, OR. December 14-19.
- Venegas R, Neill P, Kaplan DM (2000) Daily Settlement Patterns in Relation to Physical Parameters. *PISCO/Mellon Symposium*. Portland, OR. December 14-19.
- Kaplan DM (2000) Ecological Consequences of Daily Warming of Coastal Sea Surfaces. *PISCO/Mellon Symposium*. Portland, OR. December 14-19.
- Kaplan DM, Navarrete S, Guiñez R, Castilla JC (2000) Daily warming of coastal waters and its possible causes. *International Symposium on Linkages and Dynamics of Coastal systems: Open Coasts and Embayments*. Santiago, Chile. October.
- Kaplan DM, Navarrete SA, Velasco-Hernandez JX (2000) Omnivory in open systems: the effects of life history on local population dynamics. *9<sup>th</sup> Annual Meeting of the Sociedad de Ecología de Chile*. Concepción, Chile. July 28-29.
- Kaplan DM (1997) Microscopic Entropy of N=2 Supersymmetric Black Holes. *Black Holes: Theory and mathematical aspects*. Banff, Canada. May 31 - June 4.

### Laboratory and University Presentations (16):

- Kaplan DM (2007) Circulación sobre la plataforma continental en el California central y sus consecuencias para la productividad y la dispersión larval. Depto. de Geofísica, U. de Concepción, Chile. January 5.
- Kaplan DM (2006) Circulación sobre la plataforma continental en el California central

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- y sus consecuencias para la productividad y la dispersión larval. Instituto de Biología Marina, U. Austral, Chile. December 19.
- Kaplan DM (2006) Assessing sustainability and yield in networks of marine protected areas. Dept. of Ecology & Evolutionary Biology, UC Santa Cruz, California. November 1.
- Kaplan DM (2006) Marine protected areas: Pain and progress. Ken Norris Symposium on Quantitative Biology. Cambria, California. September 17-19.
- Kaplan DM (2006) HF-Radar observations of surface circulation in an upwelling system. Dept. of Ocean Sciences, UC Santa Cruz, California. May 31.
- Kaplan DM (2005) Le processus de création de réserves marines en Californie: science, politique, progrès et pièges. Centre d'Océanologie de Marseille, France. September 16.
- Kaplan DM (2005) Le processus de création de réserves marines en Californie: science, politique, progrès et pièges. IFREMER, Nantes, France. September 12.
- Kaplan DM (2004) Modeling Marine Reserves: Inside and Out. IUEM, Brest, France. October 19.
- Kaplan DM (2004) HF-Radar Observations of Surface Circulation in an Upwelling System. IRD Brest, France. October 18.
- Kaplan DM (2004) Modeling Marine Reserves: Inside and Out. Centre de Recherche Halieutique Méditerranéenne et Tropicale, IRD Sète, France. October 12.
- Kaplan DM (2004) Modeling Marine Reserves: Inside and Out. Université de Perpignan, France. October 9.
- Kaplan DM (2004) Modelación de reservas marinas: la dinámica transitoria dentro de reservas y los efectos de la configuración espacial de areas protegidas. CEAB, Blanes, Spain. October 7.
- Kaplan DM (2004) Observaciones de la circulación superficial con HF-radar en un sistema de surgencia. Instituto de Ciencias Marinas, CSIC, Barcelona, Spain. October 4.
- Kaplan DM (2004) Modelación de reservas marinas: la dinámica transitoria dentro de reservas y los efectos de la configuración espacial de areas protegidas. Universidad de Vigo, Spain. September 30.
- Kaplan DM (2004) Observaciones de la circulación superficial con HF-radar en un sistema de surgencia. Instituto de Investigaciones Marinas, CSIC, Vigo, Spain. September 29.
- Kaplan DM (2004) Modelación de reservas marinas: la dinámica transitoria dentro de reservas y los efectos de la configuración espacial de areas protegidas. Instituto Español de Oceanografía, Vigo, Spain. September 27.

### GRADUATE STUDENTS

- Julio Palleiro.** 2005-Present. CICESE, Ensenada, Mexico. Thesis committee.
- Salvador Jorgensen.** 2003-2005. University of California, Davis. Unofficial mentor.

### LANGUAGE SKILLS

English (mother tongue), Spanish (fluent), French (highly conversant)

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## COMPUTER LANGUAGES

C, Perl, Python, Matlab, R, PHP, HTML, SQL, Javascript

## REFERENCES

### Jeff Paduan

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Naval Postgraduate School, 1 University Circle, Monterey, CA 93943, USA

### John Largier

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Department of Wildlife, Fish and Conservation Biology, University of California, Davis, CA 95616

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