

BIBLIOGRAPHY

OCEAN STUDIES, OCEAN ISSUES FOR SEA: Oceanography and Marine Biology - Grade Eight

This partially annotated bibliography has been selected as an entree to the many resources available to further your study of the topics covered in *Ocean Studies*, *Ocean Issues*. A few of the titles listed are out of print, but worthwhile enough for you to check for them in your school and public libraries.

PRINT RESOURCES

- anon. Discover Wetlands. Washington Department of Ecology. Olympia, Washington.
- anon. 1987. The Saga of the Salmon. Seattle Times/Seattle Post Intelligencer. November 22, page A1.
- anon. 1993. Coho Fishing Ban Called a Bad Idea. Associated Press in Seattle Times, April 4.
- anon. 1993. Snake River Salmon National Treasure at Risk of Extinction. State of Idaho Office of the Governor, Boise, Idaho. 10pp.
- anon. "Where Does CO2 Come From?". Lawrence Livermore National Laboratory. Livermore, California.
- Arnold, Augusta Foote. 1968. The Sea-Beach at Ebb-Tide. Dover Publications. New York.
 - A detailed identification guide.
- APHA, Project Task Force Staff. 1991. Healthy Communities Two Thousand: Model Standards. American Public Health Association. New York.
- AWWA Research Foundation Staff. 1985. Future of Water Reuse:

- Proceedings. American Public Health Association. New York.
- American Water Works Association. 1996. Standard Methods for the Examination of Water and Waste Water. American Public Health Association. Washington, D.C.
- Baker, D.J. (Spring 1991). "Toward a Global Ocean Observing System" *Oceanus* 34 (1): 76-83.
- Baker, D.J. & Wilson, W.S. (Winter, 1986/87). "Spaceborne Observations in Support of Earth Science" *Oceanus* 29 (4): 76-85.
- Barnes, H. 1959. Oceanography and Marine Ecology. American Elsevier Publishing Co. New York.
 - A comprehensive college- level textbook.
- Barnes, R.S. 1993. The Invertebrates: a New Synthesis. Blackwell Scientific Publications. St. Louis, Missouri.
- Barnes, R.S. and R.N. Hughes. 1988. Introduction to Marine Ecology. Blackwell Scientific Publications. St. Louis, Missouri.
- Barnes, Robert D. 1968. Invertebrate Zoology. W.B. Saunders Company: Philadelphia.
 - Comprehensive college-level textbook.
- Barsh, Russel L. 1977. The Washington Fishing Rights Controversy: An Economic Critique. University of Washington, Graduate School of Business Administration. Seattle, Washington.
- Bascom, Willard N. 1964. Waves and Beaches: The Dynamics of the Ocean Surface. Doubleday Anchor Books.
 - A straight-forward presentation of waves, tides and how the sea interacts with the land.
- Behrens, David W. 1991. Pacific Coast Nudibranchs. Sea Challengers. Monterey, California.
 - An identification guide with color photos.
- Bjornn, T., D. Craddock, and D. Corley. 1968. Migration and Survival of the Redfish Lake, Idaho, Sockeye Salmon, *Oncorhynchus nerka*. Trans. Am. Fish. Soc., 97:360-373.

- Braus, Judy, editor. 1992. "Wading Into Wetlands" Naturescope. National Wildlife Federation. Washington, D.C.
- Brown, Bruce. 1990. Mountain in the Clouds: A Search for the Wild Salmon. Simon & Schuster, New York.
 - A readable and moving account of the natural history and issues surrounding northwest coast salmon.
- Brown, S. and J. Kinney (eds.). 1993. National Marine Sanctuary Program, Marine Sanctuary, 1(1):19.
- Buchsbaum, Ralph. 1987. Animals without Backbones. The University of Chicago Press. Chicago.
 - A readable and well illustrated introduction to scientific classification and structures and adaptation of invertebrates.
- Caduto, Michael J. and Joseph Bruchac. 1988. Keepers of the Earth: Native American Stories and Environmental Activities for Children. Fulcrum, Inc, Golden, Colorado, ISBN 1-55591-027-0. Keepers of the Earth Teacher Guide, ISBN 1-55591-040-8.
- Carefoot, Thomas. 1977. Pacific Seashores; A Guide to Intertidal Ecology. University of Washington Press. Seattle, Washington.
 - An interesting summary of research about how intertidal organisms are affected by each other and by environmental factors. It tells many fascinating stories about what is happening at the beach.
- Carroll, Geoff. "Local Harvest On the North Slope". ALASKA'S WILDLIFE, The Magazine of the Alaska Department of Fish and Game, Vol. 24, No. 1, Jan-Feb. 1992.
- Carson, Rachel. 1991. The Sea Around Us. Signet. New York.

 This classic book eloquently describes the many forces that shape the earth's oceans.
- Cohen, Fay. 1986. Treaties on Trial: The Continuing Controversy over Northwest Indian Fishing Rights. University of Washington Press. Seattle, Washington.
- Cohen, Joyce. "Oil Spill: The Lessons of Valdez" *Science World*. September 8, 1989.
- Colwell, R.R. and R. Grigorova. 1988. Methods in Microbiology. Academic Press (Harcourt Brace). San Diego, California.
- Connor, Judith and Charles Baxter. 1989. Kelp Forests. Monterey Bay

- Aquarium Foundation. Monterey, California.
- Cooper-Madlener, Judith. 1981. The Sea Vegetable Gelatin Cookbook. Woodbridge Press. Santa Barbara, California
- CRC Handbook of Chemistry and Physics. (Annual Revision). Chemical Rubber Co. Cleveland, Ohio.
- Cupp, E. E. 1977. Marine Plankton Diatoms of the West Coast of North America. Koeltz Scientific Books. Champaign, Illinois.
- Curtis, Brian. 1949. The Life Story of the Fish His Manners and Morals. Dover Publications, Inc. New York.
 - A readable introduction to the adaptations of fish.
- Dawson, E. Yale and Michael S. Foster. 1982. Seashore Plants of California. University of California Press. Berkeley, California.
- Dietrich, B. 1992. Fishy Quiz: Name Our No. 1 Upstream Migrant. Seattle Times, Aug. 7, page B8.
- Dietrich, B. 1992. Plan to Restore Salmon Runs Touted as Worldwide Model. Seattle Times, Sept. 10, page D1.
- Dyckman, Claire and Stan Garrod. 1977. Small Streams and Salmonid: A Handbook for Water Quality Studies. United Nations Educational, Scientific and Cultural Organization. Paris.
- Ellis, Richard. 1989. The Book of Sharks. Alfred A. Knopf. New York.
- Ellis, Richard. 1985. The Book of Whales. Alfred A. Knopf. New York.
- Ely, T. 1991. In Sea of Trouble. Wilderness, 55(fall):18-26.
- Fairbridge, Rhodes W. 1966. The Encyclopedia of Oceanography. Reinhold.

 A collection of information which previously was found only in text books and reference works.
- Flora, Charles J. and Eugene Fairbanks, M.D. 1966. The Sound and the Sea. Pioneer Printing. Bellingham, Washington.
 - An identification book for marine invertebrates of the Pacific northwest. Black and white photos of specimens.

- Foster, N. and J. Archer. 1988. Introduction: The National Marine Sanctuary Program Policy, Education, and Research. Oceanus 31(1):5-17.
- Gantenbien, D. 1991. Salmon on the Spot. Sierra, Jan./Feb.: 32-34.
- Gibbs, A. 1991. Search for a Consensus Solution Has Yet to Bear Fruit. The Morning News Tribune, June 11, Page A9.
- Gotshall, Daniel W. 1994. Guide to Marine Invertebrates. Sea Challengers. Monterey, California.
 - An identification guide with color photos.
- Gotshall, Daniel W. 1989. Pacific Coast Inshore Fishes. Sea Challengers. Monterey, California.
 - An identification guide to Pacific coast fish with color photos.
- Gotshall, Daniel W. and Laurence L. Laurent. 1980. Pacific Coast Subtidal Marine Invertebrates. Sea Challengers. Los Osos, California.
 - A rare identification guide dedicated to subtidal invertebrates. Color photos.
- Hallam, A. "Alfred Wegener and the Hypothesis of Continental Drift", Scientific American. February, 1975.
- Hardy, A. H. 1961. The Open Sea: Its Natural History: Part I The World of Plankton. Houghton-Mifflin Co. Boston.
 - To quote one reviewer, "This is one of the great books about the sea of our generation. The best introduction to marine biology for the layman that we have."
- Hart, J. L. 1973. Pacific Fishes of Canada. Bulletin 180. Fisheries Research Board of Canada. Ottawa.
 - A comprehensive guide to eastern Pacific fish species. Contains a line drawing of each species and natural history information.
- Hilgard, Galen Howard, ed. 1987. Observing Marine Invertebrates; Drawings from the Laboratory. Stanford University Press. Stanford, California.
 - Line drawings by students of external and internal anatomy of marine invertebrates.
- Henderson, Sandra, et. al. 1993. *Global Climates--Past, Present and Future*. U.S. Environmental Protection Agency, Office of Research and Development. Washington, D.C.
- Hirschfelder, Arlene B. 1986. Happily May I Walk: American Indians and

- Alaska Natives Today. Scribners Young Readers. New York.
- Hirschfelder, Arlene B. 1993. The Native American Almanac: A Portrait of Native America Today. Prentice Hall. New York.
- Hocking, Colin, et al. 1990. *Global Warming and the Greenhouse Effect*, Great Explorations in Math and Science (GEMS). The Regents of the University of California. Berkeley, California.
- Houghton, J.T., et. al. 1990. *Climate Change: The IPCC Scientific Assessment.* The Intergovernmental Panel on Climate Change. Cambridge University Press.
- Hume, M. 1992. Enforcement Vacuum Blamed for Loss of Salmon. Vancouver Sun (Vancouver, B.C.), Nov. 17, page B8.
- Huyghe, P. (December 1986). "Sea floor Mapping" Oceans 22-29.
- _____. "Oceanography from Space". Fall 1981 Oceanus 24 (3).
- Idyll, C.P. 1964. Abyss. Thomas Y. Crowell Co.

 A most interesting treatment of the deep oceans and the creatures that dwell therein.
- Johnson, F.H., and Y. Haneda. 1966. Bioluminescence in Progress. Princeton University Press. Princeton, New Jersey.
- Judd, R. 1992. Alarming Coho Run May Prompt Fishing Ban. Seattle Times, Nov. 12, page A1.
- Kinne, Otto. 1967. Physiology of estuarine organisms with special reference to salinity and temperature: general aspects. In Lauf, G., ed., Estuaries. Publication No. 83, American Association for the Advancement of Science, Washington, D.C.
- Kinne, Otto and H.P. Bulnheim. 1969. Cultivation of Marine Organisms and Its Importance for Marine Biology. Koeltz Scientific Books. Champaign, Illinois.
- Kohm, K. 1991. Balancing on the Brink of Extinction. Island Press. 318 pages.
- Kozloff, Eugene N. 1987. Marine Invertebrates of the Pacific Northwest. University of Washington Press. Seattle, Washington
- Kozloff, Eugene N. 1983. Seashore Life of the Northern Pacific Coast. University of Washington Press.

- An identification guide organized by habitat. Contains abundant information on scientific classification of organisms and tidbits of natural history about most of the organisms.
- Lamb, Andy and Phil Edgell. Coastal Fishes of the Pacific Northwest. Harbour Publishing. Madeira Park, British Collumbia, Canada.
 - An easy to use identification guide to fish species.
- Lewis, R. 1991. Can Salmon Make a Comeback? Bioscience 4(1):6-10.
- Love, Robin Milton. 1991. Probably More Than You Want to Know About the Fishes of the Pacific Coast. Really Big Press. Santa Barbara, California.

 A readable and very entertaining book about the adaptations of fish.
- Lowe, M. 1988. Salmon Ranching and Farming Net Growth Harvest. Worldwatch, Jan./Feb., pages 28-32.
- Meglitsch, Paul A. and Frederick R. Schram. 1991. Invertebrate Zoology. Oxford University Press. New York.
 - A comprehensive college-level textbook.
- Morholt, Evelyn and Paul F. Brandwein. 1986. Sourcebook for the Biological Sciences.
 - If you need the recipe for a pH indicator or procedures for growing brine shrimp, this book will help. Useful descriptions of lab techniques, procedures and materials.
- Morris, Robert H., Donald P. Abbott, and Eugene C. Haderlie. 1980. Intertidal Invertebrates of California. Stanford University Press. Stanford, California. A huge compendium of descriptions and information about intertidal invertebrates.
- Muckleston, K. 1990. Striking a Balance in the Pacific Northwest. Environment 32(1):10-35.
- NASA. *Atlas 2 Teacher's Guide* available from: NASA Ames Teacher Resource Center; Moffett Field, CA 94035
- Nehlsen, Willa, Jack E. Williams and James Lichatowich. "Pacific Salmon at the Crossroads; Nature's Blue Chip Stocks in Peril." Trout, Winter, 1992.

- Newell, G. E., and R. C. Newell. 1963. Marine Plankton A Practical Guide. Hutchinson Educational, Ltd. London.
 - A useful guide, but no longer in print.
- Niesen, Thomas M. 1982. The Marine Biology Coloring Book. Harper Collins. New York.
 - Useful for student assignments and as a reference. Contains pages for students to color code and information about each page.
- Nybakken, James W. 1988. *Marine Biology, an Ecological Approach*. Harper and Row. New York.
- Palensky, J. 1991. The Downstream Dilemma. The Morning News Tribune, Tuesday, June 11, page A1.
- Pauley, G., R. Risher, and G. Thomas. 1989. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Northwest): Sockeye Salmon. U.S. Fish and Wildlife Service, National Wetlands Research Center. Washington, D.C.
- Piccard, Jacques, and Dietz, Robert S. 1961. Seven Miles Down, The Story of the Bathyscaphe Trieste. G.P. Putnam's Sons.
 - An account of the bathyscaphe and its deepest dive. Good for engendering student interest in oceanography.
- Polmar, Norman. 1964. Death of the Thresher. Chilton Book Co.

 Documentary account of the loss of a U.S. atomic submarine with its one hundred twenty-nine crewmen.
- Potter, F. (ed.). 1993. National Marine Sanctuaries: Challenge and Opportunity. Center for Marine Conservation, Washington, D.C.
- Pryne, E. 1992. Low Stream Flows Threatening Salmon. Seattle Times, Aug. 7, page A1.
- Raab, Carl M. and Jane E. S. Sokolow. 1992. *Global Warming: Understanding the Forecast*. American Museum of Natural History and Environmental Defense Fund. New York.
- Reid, George K. and Herbert S. Zim. 1967. *Pond Life*. Golden Press. New York.

- Reish, Donald J., editor. 1969. Biology of the Oceans. Dickenson Publishing Co., Inc.
 - An anthology of biological oceanographic articles giving insight into methods and types of research done by the biologist in the sea.
- Ricketts, E. W., and J. Calvin. 1985. Between Pacific Tides. 5th. ed., revised by J. W. Hedgpeth. Stanford University Press. Stanford, California.

 A classic guide to intertidal life along the California coast written by Ed Ricketts, the biologist immortalized by John Steinbeck in *Cannery Row*.
- Russell, F.S. 1984. Advances in Marine Biology. Academic Press (Harcourt Brace). San Diego, California.
- Saunders, R. 1992. Creating an Ocean Constituency: Citizen Involvement in the National Marine Science Program. J. Marine Education, 11(2): 27-29.
- Scagel, R.F. 1967. Guide to Common Seaweeds of British Columbia. British Columbia Provincial Museum. Victoria, British Columbia, Canada.
- Schneiderwind and Ellen Davidson. 1983. Open Minds to Equality: A Sourcebook of Learning Activities to Promote Race, Sex, Class and Age Equity. Prentice Hall. New York.
- Slattery, Britt Eckhardt. 1991. WOW!: The Wonders of Wetlands.. Environmental Concern Inc. St. Michaels, Maryland.
- Smith, Deboyd L. 1977. A Guide to Marine Coastal Plankton and Marine Invertebrate Larvae. Kendall/Hunt Publishing Company. Dubuque, Iowa. No longer in print, but the best book around for identification of plankton.
- Smith, R. I., and Carlton, J. T. 1975. Light's Manual, Intertidal Invertebrates of the Central California Coast. University of California Press. Berkeley, California.
- Snively, Gloria. 1991. Exploring the Seashore. Gordon Soules Book Publishers. Vancouver, British Columbia, Canada.
 - An excellent identification guide, complete with general ecological information, line drawings and interesting natural history notes.
- Southward, A.J. 1965. Life on the Sea-Shore. Harvard University Press.

 Provides excellent examples of how to study various problems of biology on the sea shore. Recommended for those interested in designing constructive field trip exercises.

- Stafford-Deitsch, Jeremy. 1988. Shark: A Photographer's Story. Sierra Club Books. San Francisco.
- Strickland, Richard M. 1983. The Fertile Fjord Plankton in Puget Sound. University of Washington Press. Seattle, Washington.
- Studds, G. 1993. Capital Improvements. Marine Sanctuary, 1(1):16-17.
- Sumich, James L. 1992. An Introduction to the Biology of Marine Life. Wm. C. Brown Publishers. Dubuque, Iowa.
 - A high school or college level textbook.
- Teton, G. and S. Broderick. 1990. Listing the Snake River Race Sockeye Salmon as Endangered. Shoshone-Bannock Tribes of the Fort Hall Indian Reservation in Idaho.
- Tippie, V.K. & Cawley, J.H. (Spring 1991). "Modernizing NOAA'S Ocean Services." *Oceanus* 34 (1) 84-93.
- Trefil, James S. 1987. A Scientist at the Seashore. Collier Books. New York. An interesting book exploring the simple, yet complex, questions anyone might wonder about how things work at the seashore.
- Vernberg, W. and F.J. Vernberg. 1972. Environmental Physiology of Marine Animals. Springer-Verlag. New York.
- Waples, R., O. Johnson, and R. Jones. 1991. NOAA: Status Review for the Snake River Sockeye Salmon. National Marine Fisheries Service, Environmental and Technical Services Division, Portland, Oregon.
- Warner, William W. 1977. Beautiful Swimmers. Penguin Books.

 A natural history of the blue crab is combined into a study of Chesapeake Bay and of the water men who make a living in the crab's pursuit.
- Wasserman, Pamela and Andrea Doyle. 1991. *Earth Matters*. Zero Population Growth. Washington D.C.
- Weiner, Jonathan. 1990. The Next One Hundred Years: Shaping the Fate of our Living Earth. Bantam Books. New York.
- Weiss, Howard M. and Michael W. Dorsey. 1979. Investigating the Marine Environment: A Sourcebook. Project Oceanology. Groton, Connecticut. Contains a wealth of ideas and technical information for lab and field experiences.
- Williamson, W.M., editor. 1946. The Eternal Sea: An Anthology of Sea Poetry.

Books for Libraries, Inc.

Twenty-one chapters of poetry arranged by titles such as "The Call of the Sea", "Homeward Bound; Making Port", "Fishermen..."

Wilson, J. Tuzo. 1976. Continents Adrift and Continents Aground a Scientific American publication. W.H. Freeman and Company. San Francisco, California.

Wimpenny, R. S. 1966. The Plankton of the Sea. American Elsevier Publishing Co. New York.

Yates, Steve. 1988. Adopting a Stream. University of Washington Press. Seattle, Washington.

OTHER RECOMMENDED MATERIALS

Print Materials

Bathymetric maps, write:

National Ocean Service 1315 East West Highway Silver Spring, Maryland 20910

also the following National Geographic Maps:

"The World, Endangered Earth", December 1988.

"World Ocean Floors: Exploring and Mapping the Sea Floor", January 1990.

"World Ocean Floor", December 1981.

Topographic maps and demonstration models, write:

U. S. Geological Survey Education Office 345 Middlefield Road Menlo Park, CA 94025 (415) 329-4006

Mac's Field Guides:

A series of plastic cards with color illustrations of animals to use for identification in the field. There are many guides for both terrestrial and aquatic habitats and for different regions of the west. Examples:

Northwest Coastal Fishes, Northwest Coastal Invertebrates, Northwest Marine Birds, Whales and Dolphins... Mac's Field Guide, The Mountaineers, 1011 S.W. Klickitat Way, Seattle, WA 98134; (206) 223-6303.

Environmental Science Activities Kit.

By Roa, Michael L. 1993. The Center for Applied Research in Education. West Nyack, New York, 10995.

Videos, Films

Nature series episodes, PBS, including:

Elephant Seals
Warm Hearts, Cold Water (sea otters)
Incredible Suckers (cephalopods)
Under the Emerald Sea
Jewels of the Caribbean
Island of the Whales
Spirit of the Sound

NOVA productions, PBS, including:

Swimming with Whales Cashing In On The Ocean

Agencies

For more information on global systems studies, contact:

NASA's Mission to Planet Earth NASA Public Affairs Officer National Aeronautics and Space Administration Washington, D.C. 20546 (202) 358-1547

UCAR Office for Interdisciplinary Earth Studies P.O. Box 3000 Boulder, Colorado 80307-3000 (303) 497-1682

NOAA Office of Global Programs Education Program Manager 1100 Wayne Ave, Suite 1225 Silver Springs, MD 20910

The Earth Observing System
Earth Science & Applications Division
NASA Headquarters (Code EE)
600 Independence Avenue SW
Washington, D.C. 20227 - 2028

NASA Ames Research Center Teacher Resource CenterMail Stop TO25 Moffett Field, CA 94035 (415) 604-3574

For more information regarding Asian clams, contact:

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The Books That Inspire Marine Biology

John Trowbridge and Jim Wandersee*

Results of a survey of 1200 marine educators and scientists concerning the use of marine literature for instructional purposes.

Recommended Readings by All Groups

(includes noninstructional books)

Top 25 Suggested titles out 583 suggested books and 416 different titles

Rank	Title	<u>Author</u>
1.	The Sea Around Us	Rachel Carson
2.	Log From the Sea of Cortez	John Steinbeck
3.	Beautiful Swimmers	William Warner
4.	Life and Death of the Salt Marsh \dots	John and MildredTeal
5.	Edge of the Sea	Rachel Carson
6.	Kon Tiki	Thor Heyerdahl
7.	The Living Dock	Jack Rudloe
8.	Moby Dick	Herman Melville
9.	Old Man and the Sea	Ernest Hemingway
10.	Silent Spring	Rachel Carson
11.	Sailing Alone Around the World	Joshua Slocum
12.	Seaside Naturalist	Deb Colulombe
13.	Under the Sea Wind	Rachel Carson
14.	Cannery Row	John Steinbeck
15.	Chesapeake	James Michener
16.	Island of Blue Dolphins	Scott O'Dell
17.	Marine Biology Coloring Book	Niesen
18.	Outermost House	Henry Betson
19.	Silent World	Jacques Cousteau
20.	Soundings	Frank Searles
21.	Time of the Turtle	Jack Rudloe
22.	Voyage of the Beagle	Charles Darwin
23.	Waves and Beaches	Willard Bascom
24.	Whale for the Killing	Farley Mowatt
25.	Year of the Crab	William Sargent

Books Instructors Suggest Their Students Read

Top 5 of 81 titles	given
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Rank	Title	Author
1.	Log From the Sea of Cortez.	John Steinbeck
2.	Moby Dick	Herman Melville
3.	The Sea Around Us	Rachel Carson
4.	Life and Death of the Salt Ma	arshJohn and MildredTeal
5.	Cannery Row	JohnSteinbeck

Books Selected as Required Reading in Courses Taught

Top 10 of 125 titles

Rank	Title	<u>Author</u>
1.	Life and Death of the Salt Marsh	John and Mildred Teal
2.	Beautiful Swimmers	William Warner
3.	Kon Tiki	Thor Heyerdahl
4.	Old Man and the Sea	Ernest Hemingway
5.	The Sea Around Us	Rachel Carson
6.	Two Years Before the Mast	R.H. Dana
7.	Twenty Thousand Leagues Under the Sea	Jules Verne
8.	Silent Spring	Rachel Carson
9.	Whale for the Killing	Farley Mowatt
10.	Under the Sea Wind	RachelCarson

Books That Influenced Respondents or Which Affected Their Job Choice

Top 5 of 49 titles

Rank	Title	Author
1.	Between Pacific Tides	Ed Rickets
2.	SilentSpring	RachelCarson
3.	The Sea Around Us	Rachel Carson
4.	Log From the Sea of Cortez	John Steinbeck
5.	Silent World	Jacques Cousteau

Books With Which Respondents Philosophically Identify

Out of 37 suggested titles only two books were suggested by three people:

Sand County Almanac	Aldo Leopold
Silent Spring	Rachel Carson

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